

**PREVALENCE AND FACTORS ASSOCIATED WITH THE  
USE OF SEXUAL ENHANCERS AND ERECTILE  
DYSFUNCTION MEDICATIONS AMONG MALE  
UNDERGRADUATES AGED 18-35YRS AT JOMO  
KENYATTA UNIVERSITY OF AGRICULTURE AND  
TECHNOLOGY, KENYA**

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**Prevalence and Factors Associated with the Use of Sexual Enhancers  
and Erectile Dysfunction Medications among Male Undergraduates  
aged 18-35yrs at Jomo Kenyatta University of Agriculture and  
Technology, Kenya**

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**A Thesis Submitted in Partial Fulfillment of the Requirements for  
the Degree of Master of Science in Public Health of the Jomo  
Kenyatta University of Agriculture and Technology**

**2023**

**DECLARATION**

This thesis is my original work and has not been presented for a degree in any other University.

Signature..... Date.....

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This thesis has been presented for examination with our approval as University supervisors.

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## **DEDICATION**

I dedicate this work to my dear mum and dad who made me what I am today, my daughter, Kayse Katinda for her daily inspiration, and my siblings for their support and encouragement.

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## **LIST OF ABBREVIATIONS/ACRONYMS**

<b>CDC</b>	Centers for Disease Control and Prevention
<b>DHEA</b>	Dehydroepiandrosterone
<b>ED</b>	Erectile Dysfunction
<b>EDMs</b>	Erectile Dysfunction Medications
<b>FDA</b>	Food and Drug Administration
<b>HIV</b>	Human Immunodeficiency Virus
<b>MSM</b>	Men who have Sex with Men
<b>PDE5Is</b>	Phosphodiesterase-5-inhibitors
<b>STI</b>	Sexually Transmitted Infections

## OPERATIONAL DEFINITION OF TERMS

<b>Access</b>	Condition allowing the reach of EDMs and/or sexual enhancers.
<b>Attitude</b>	Beliefs on EDMs and/or sexual enhancers.
<b>Erectile dysfunction</b>	It is a persistent difficulty achieving and maintaining an erection sufficient to have sex.
<b>Erectile dysfunction medications</b>	These are FDA-approved oral medications that reverse erectile dysfunction by enhancing the effects of nitric oxide, a natural chemical that the body produces that relaxes the muscles of the penis.
<b>Phosphodiesterase 5 inhibitors</b>	These are a type of targeted therapy used to treat erectile dysfunction(ED). The four major PDE5 inhibitors are sildenafil (Viagra), tadalafil (Cialis), vardenafil (Levitra), and avanafil (Stendra).
<b>Practices</b>	Things that students mostly do in relation to sexual matters.
<b>Sexual enhancers</b>	Other substances (herbal or synthetic) that are not EDMs that are used to increase blood flow to the genital region necessary for an erection.

## ABSTRACT

Oral erectile dysfunction medications and sexual enhancers have increasingly been used among young men without a medical indication. Recreational use of EDMs and sexual enhancers is associated with risky sexual behavior and substance use. In recognition of the sexual health challenges facing the youth, this study sought to establish the level of utilization of sexual enhancers and EDMs and factors associated with their use among the youth in JKUAT. Mixed methods were used. It adopted a cross-sectional quantitative study design (through self-administered questionnaires) and a concurrent qualitative study (through Focus Group Discussions). Simple random sampling was used to obtain the required sample size for quantitative data (420 male undergraduate students) and convenience sampling was used to obtain the sample for qualitative data (48 male undergraduate students). SPSS was used to analyze quantitative data while Nvivo software was used to analyze qualitative data. The findings of this study revealed that among the 420 respondents, 10 % (n=42) had used EDMs and/or sexual enhancers. There was a significant relationship between EDM and/or sexual enhancers use and age ( $P<0.001$ ), religion ( $P=0.013$ ), number of sexual partners ( $P=0.027$ ), number of 'one-night' stands ( $P=0.003$ ), and use of condom or knowledge of partner's status before intercourse ( $P=0.011$ ). However, there was no significant relationship between EDMs and/or sexual enhancers' use and most of the socio-demographic factors. Most of the EDMs and/or sexual enhancers users are involved in risky sexual behavior and substance abuse including alcohol consumption. The university social environment influenced sexual risk behaviors. Continuous awareness campaigns aimed at educating undergraduate students about the risks involved in the recreational use of EDMs and/or sexual enhancers should be done.



## CHAPTER ONE

### INTRODUCTION

#### 1.1 Background Information

The Food and Drug Administration (FDA)-approved drugs for Erectile Dysfunction (ED) include sildenafil (Viagra), tadalafil (Cialis), Cialis for daily use, vardenafil (Levitas), and Stendra (FDA, 2015). These erectile dysfunction medications (EDMs) are effective and well-tolerated for the treatment of erectile dysfunction of various etiologies and it has been estimated that over 25 million men worldwide have been prescribed sildenafil alone (Rosen & Kostis, 2003; McMurray *et al.*, 2007). Apart from the FDA-approved EDMs, vitamins, foods, supplements, herbs, and other natural sexual enhancers are used to enhance the sexual experience.

Although erectile dysfunction medications are FDA-approved to treat erectile dysfunction, there is substantial evidence indicating that these drugs have increasingly been used as a sexual enhancement aid among men without any medical indication (Harte & Meston, 2011). This new phenomenon has raised public health concerns regarding its association with increased sexual risk behavior (Gebreyohannes *et al.*, 2016). Studies in samples of men who have sex with men (MSM) have shown that those who recreationally use sildenafil are between two and six times as likely to engage in unprotected intercourse with a partner with unknown or serodiscordant HIV status than nonusers (Swearingen & Klauser, 2005). Recreational EDM users also report a higher number of sex partners ((Harte & Meston, 2012) and approximately double the rate of sexually transmitted infections (STIs) including HIV infections (Jackson, 2005).

Further studies have indicated that many men who are seeking medical help for sexual health issues have reported using sexual enhancers (Campbell *et al.* 2013). A study carried out by Gebreyohannes *et al.* (2016), showed that the prevalence of PDE5 inhibitor use among undergraduate students in an Ethiopian University was 5.5 % while cigarette smoking, other substance use, and a greater number of sexual

partners was associated with PDE<sub>5</sub> inhibitor use. There is little regulation on the ingredients or dosage of the sexual enhancing supplements and thus, the health effects of these products are unknown. Some of the dietary supplements contain traces of Viagra which can be dangerous to men since it enhances blood flow and can result in cardiovascular complications (Campbell *et al.* 2013). Studies have further indicated that most of these sexual enhancers have no scientific evidence supporting claims that they can improve libido, erectile dysfunction, or sexual performance (Gebreyohannes *et al.*, 2016). The supposedly 'natural' products have traces of phosphodiesterase-5-inhibitors (PDE5Is), the medication found in prescription drugs such as Viagra used to treat impotence (Musacchio *et al.*, 2006). Phosphodiesterase-5-inhibitors (PDE5Is) are not legally allowed to be sold over the counter and men who use these medications without a physician's supervision run the risk of taking them inappropriately.

In Kenya, according to Gisesa (2012), most young men and especially college students buy sex enhancement drugs regularly, a trend that is worrying the health experts. The Kenya Pharmaceuticals Distributors Association acknowledges that the use of sex enhancement drugs and other sex enhancers has been on the rise in recent years and its popularity was outperforming the most common painkillers. Men as young as 16 years are influenced into using these drugs and most of them do not suffer from erectile dysfunction that would necessitate the use of these drugs (Gisesa, 2012).

The Erectly Dysfunction Medications are meant to treat erectile dysfunction and pulmonary arterial hypertension yet most sexually active young men are casually and recreationally using them (Gebreyohannes *et al.*, 2016). Erectly dysfunction medications are prescription drugs yet most pharmacies in Nairobi and other major towns in Kenya are selling them over the counter to anyone willing to acquire them. Young men are carelessly using these medications, ignorant of their main purpose and the long-term effects on their sexual and overall health.

## 1.2 Statement of the Problem

The effectiveness and ease of use of erectile dysfunction medication and other sex enhancers have made them increasingly abused by men without a medical indication. This has raised public health concerns, as recreational use of EDMs and sex enhancers has been associated with increased sexual risk behaviors. Studies have demonstrated that recreational EDMs and sexual enhancers' users report higher rates of unprotected intercourse, a higher number of recent sex partners, and present elevated rates of sexually transmitted infections. Grabovac et al. (2018) suggest that an increased rate of sexually transmitted diseases including HIV/AIDs has been associated with the recreational use of erectile dysfunction medications with users mostly engaging in risky sexual behaviors.

Musacchio *et al.*, (2006) acknowledge that most young men who seek the help of EDMs do not suffer from erectile dysfunction but rather sexual dissatisfaction. Oblivious to the main purpose of the EDMs, most young men keep using them to aid their sexual arousal (Wangari, 2012). They self-diagnose their ED and easily buy counterfeit drugs online because most of the internet sites sell them without prescription. Obtaining these drugs without a physician's advice can potentially result in drug overdose and dangerous drug-drug interactions, putting the person's health at risk.

Relatively less attention has been given to the potential adverse effects of recreational use of EDMs and sexual enhancers. There are also very few studies on erectile dysfunction among young men and the recreational use of EDMs and sexual enhancers among undergraduate students. Most of the prior studies have sampled from high-risk populations, such as patients at STI/HIV clinics, Men who have Sex with Men (MSM) attending parties, and nightclubs but little data is available regarding recreational use in young heterosexual men (Harte & Meston, 2012). In recognition of the sexual health challenges facing the youth, there is a need for a study to establish the prevalence of the utilization of sexual enhancers and EDMs and factors associated with their use among the students at Jomo Kenyatta University (main campus) in Juja.

### **1.3 Justification of the Study**

The present study attempts to build upon the relatively underexplored literature on the recreational use of EDMs and sexual enhancers among young healthy men in Kenya. The intentional sampling of undergraduate students provides leverage against the confounding effects of clinically significant age-related erectile dysfunction symptoms. Furthermore, Kithuka (2014) reports that undergraduate students report high rates of alcohol and drug use as well as high rates of sexual risk-taking behaviors that are associated with the use of EDMs and sex enhancers.

Establishing the prevalence of utilization of EDMs and sexual enhancers and the associated factors among college students will enable policy-makers to develop and enforce policies and regulations regarding the use, sale, and distribution of unregulated sexual enhancers on the market today. Because of the easy availability and growing popularity of Viagra and other EDMs, they have become the most counterfeited drugs in the world. The market has been flooded with unregulated products with unknown dosages. The fact that the youth are still using them predisposes them to numerous risks including cardiovascular and sexual health risks. The results will help assess the quality of information students have on sexual enhancers and EDMs and how it contributes to the utilization.

### **1.4 Research Questions**

1. What is the prevalence of the use of EDMs as well as sexual enhancers among male undergraduate students at JKUAT?
2. What are the different types of sexual enhancing or erectile dysfunction drugs used by male undergraduate students at JKUAT?
3. What is the source(s) of acquisition of the EDMs and sex enhancers among male undergraduate students at JKUAT?
4. What are the factors associated with the utility of the sexual enhancing drugs and/or EDMs among male undergraduate students at JKUAT?

## **1.5 Objectives**

### **1.5.1 General Objective**

To assess the prevalence and factors associated with the use of sexual enhancers and erectile dysfunction medications among male undergraduates aged 18-35yrs at JKUAT, Kenya.

### **1.5.2 Specific Objectives**

1. To determine the prevalence of sexual enhancers as well as EDMs use among male undergraduate students at JKUAT.
2. To establish the different types of sexual enhancing drugs and EDMs used by male undergraduate students at JKUAT.
3. To establish the source(s) of acquisition of the EDMs and sex enhancers used by male undergraduate students at JKUAT.
4. To determine the factors associated with the utilization of EDMs and Sexual enhancers among male undergraduate students at JKUAT.

## **1.6 Hypothesis**

Based on the research questions and objectives, the study adopted the following hypothesis.

**H<sub>0</sub>:** There is no significant association between lifestyle, individual, socio-cultural, and structural factors and with EDM and/or sexual enhancers' use.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

According to the Centers for Disease Control and Prevention (CDC), prescription drug abuse is an epidemic globally and particularly in the United States. Prescription drug abuse can be defined as the intentional self-administration of a medication for a non-medical purpose. Individuals abuse medication for different reasons including 'getting high' and EDMs are some of the most commonly abused medications.

Erectile dysfunction medication (EDM) or phosphodiesterase 5 inhibitors such as Viagra, Cialis, Stendra, and Levitra are increasingly being misused by a large number of men. Recreational use or misuse of EDMs typically means that men take these drugs to enhance their sexual experiences even though they do not have any medical need or indication for the drug. According to Harte and Menston (2012), oral erectile dysfunction medications (EDMs) have become an increasingly popular drug of abuse among men without any medical indication. Studies have indicated that young, healthy, recreational users of erectile dysfunction may eventually lose confidence in their erectile abilities. This chapter reviewed literature by different scholars in recreational use of EDMS and/or sexual enhancers.

#### **2.2 Prevalence of Misuse of Erectile Dysfunction Medication**

Since the 1990s, there has been increasing recognition that erectile dysfunction is a common phenomenon. Globally, more than 150 million men experience erectile dysfunction (Doheny, 2012). The first large-scale community study including a sample of Massachusetts Male Aging indicated that 52 % of men aged 40 to 70 years were affected at some point but with varying severity (Doheny, 2012). This study provided that erectile dysfunction increased with age indicating that about 40% of men at 40 years and the rate increases to 70% of men at 70 years. This study also noted that erectile dysfunction was mostly recorded in patients with hypertension, heart disease, and diabetes.

According to Harte and Meston (2011), erectile dysfunction affects approximately 34 million men in the United States. This condition is more common in old age. Approximately 9 % of men between 18 and 39 years are affected while 70% of men above 60 years old suffer from erectile dysfunction. It is challenging to provide the exact number of men who engage in the recreational use of erectile dysfunction medication because most studies depend on self-reporting. Furthermore, men can easily get doctors to prescribe erectile dysfunction drugs by complaining that they are experiencing symptoms of erectile dysfunction.

Daskalopoulou *et al.* (2014) conducted a study to determine the recreational use of erectile dysfunction medication among men having sex with men in the UK. This study included 2248 participants and 460 (approximately 21% of the sample) had used erectile dysfunction medication in the previous three months before data collection. Garin *et al.* (2017) conducted a cross-sectional study to determine the recreational use of drugs including erectile dysfunction medication among individuals with HIV. The findings indicated that 28.3% of the sample had recreationally used sildenafil within the past year before the data was collected. After sildenafil became legalized in the United Kingdom, McCambridge *et al.* (2006) observed that it became commonly used among illicit drug users in Britain.

According to a study conducted by Harte and Meston (2011), 4% of 1,944 young, healthy, undergraduate men surveyed stated that they used erectile dysfunction drugs for recreational purposes at some point during their lives while 1.4% indicated that they were using them at the time of the study. The study included men from 497 undergraduate institutions within the United States who were recruited between January 2006 and May 2007. The authors of the study also noted that 86 % of the respondents were heterosexual; an indication that recreational use of erectile dysfunction medication occurs outside the homosexual cohort.

Santtila *et al.* (2007) conducted a study to estimate the frequency of recreational use of erectile dysfunction medication and identify any adverse effects on the confidence in gaining and holding erections from such use. The study included a sample of 4428 men with a mean age of  $29.51 \pm SD$  years. The findings indicated that 2.6 % of the

sample recreationally used erectile dysfunction medication while 0.9 % used them for medical purposes. The study was carried out by Harte and Meston (2012) among 1207 sexually active undergraduate men with an average age of  $22 \pm SD$  years. The findings indicated that 72 participants were recreational users, reporting no diagnosis from the doctor, 1,111 participants were non-users of erectile dysfunction medication, and 24 participants used prescribed drugs.

According to Atsbeha et al. (2021), most men who use Viagra, use it for recreational purposes. These findings were supported by a study conducted by Pantalone *et al.* (2008) among 912 gay/bisexual men in New York City, 28.0% of them had recreationally used erectile dysfunction medication within three months before data was collected. This is an indication that gay or homosexual men had a significantly high level of use of EDMs, unlike their heterosexual counterparts.

More studies have established the prevalence of recreational use of erectile dysfunction medication using different study groups. For instance, Korkeas *et al.* (2008) conducted a study to determine the recreational use of phosphodiesterase type 5 inhibitors among young healthy men. The survey included 167 male medical students with an average age of 21.2 years. The findings indicated that 9 % of the participants reported the use of the PDE5 inhibitors without any prescription and 46.7 % of them had used these drugs more than three times. Gebreyohannes *et al.* (2016) conducted a study at the University of Gondar in Ethiopia to determine the prevalence of PDE5 inhibitor use among undergraduate students. The average age of the participants was 21.9 years and the findings indicated that 5.5 % of the participants had used PDE5 inhibitors at least once.

### **2.3 Types of Erectile Dysfunction Medication**

In recent years, there has been a proliferation of medication for sexual performance. Oral medications are the first line of erectile dysfunction treatment for many men. They include Sildenafil (Viagra), Tadalafil (Cialis, Adcirca), Vardenafil (Staxyn, Levitra), and Avanafil (Stendra) (Elsevier Health Sciences, 2005). All four medications enhance the effect of nitric oxide- a natural chemical the body produces



that relaxes the muscles in the penis. It also increases blood flow and allows an individual to get an erection in response to sexual stimulation.

Taking one of these tablets does not automatically produce an erection. Sexual stimulation is produced first to effect the release of nitric oxide from the penile nerves. These medications amplify that signal, allowing some men to function normally (Hatzimouratidis *et al.*, 2010). It is important to note that, oral erectile dysfunction medications are not aphrodisiacs, do not cause excitements, and are not needed in men who get normal erections.

These medications vary in dosage, how long they work, and side effects. Some of the possible side effects include headaches, nasal congestion, stomach upset, backache, and visual changes (Wespes *et al.*, 2013; Gebreyohannes *et al.*, 2016). Usually, the doctor examines the patient's situation and determines the medication that works best for them. The patient needs to work with the physician before taking any medication for erectile dysfunction, including over-the-counter supplements and herbal remedies.

Medications for erectile dysfunction did not always work in all men and might be less effective in certain conditions, such as in diabetic patients and those who have undergone prostate surgery (Ahmed *et al.*, 2017). They might also be dangerous if one took nitrate drugs such as nitroglycerin, isosorbide mononitrate, and isosorbide dinitrate which are mostly prescribed for chest pain (angina). They are also unsafe for people with low blood pressure (hypotension), had heart disease, or heart failure.

Apart from FDA-approved erectile dysfunction medication, many men seeking medical help for sexual health issues reported using dietary supplements as well as herbal aphrodisiacs (Kotta *et al.*, 2013). Some of the most commonly used products include horny goat weed, maca, ginseng, fenugreek, Ginkgo biloba, and DHEA. In Kenya, some of the sex enhancers on the market include Vega 100, Stamina, Miagra, and Enzoy.

Many supplements promoted for erectile dysfunction have been observed to be tainted with drug ingredients or other related substances. Chiang *et al.* (2017) indicated the lack of regulation of ingredients and dosage of these supplements. Therefore, some of over-the-counter male sexual enhancers purchased in Asia and the United States contained traces of phosphodiesterase-5-inhibitors (PDE5Is). Furthermore, many of these products have traces of ingredients used in Viagra that can be dangerous to men with some health problems (Chiang *et al.*, 2017). These contaminants may interact with prescription drugs in harmful ways. For instance, some of the contaminants may interact with drugs containing nitrates, leading to a dangerous decrease in blood pressure.

## **2.4 Factors Associated with Recreational Use of EDMs and Sex Enhancers**

Studies have identified several factors associated with the recreational use of erectile dysfunction medication and sex enhancers. Some of the factors that have been given special attention by scholars include frequency and length of use, purpose, and motivation for use, sources of acquisition, concomitant illegal drug use, risk factors, and level of awareness regarding dosage.

### **2.4.1 Purpose and Motivation for Use**

Men who use erectile dysfunction medication or sex enhancers usually look for longer erections, and it can either be under prescription or recreationally. There is mounting evidence indicating that EDMs have become increasingly used as a sexual enhancement aid among men without any medical indication. According to Gebreyohannes *et al.* (2016), the motivation behind PDE5 inhibitor use was to increase erectile sensation, increase rigidity, enhance self-esteem, and satisfy or impress the partner. A study conducted by Bechara *et al.* (2010) revealed that the reasons for taking PDE5 inhibitors were related to erection quality, sexual confidence, and better sexual performance. Recreational EDM users have lower confidence in their erectile ability than non-users even when they had a better erectile function (Santtila *et al.*, 2007).

### **2.4.2 Sources of Acquisition**

Recreational use of erectile dysfunction medication is facilitated by the ease with which users obtain them (Gebreyohannes et al., 2016). Users usually go to physicians to obtain more prescription refills than needed. Online pharmacies are also primary sources of acquisition. Studies have indicated concerns regarding the quality and safety of the drugs obtained from online pharmacies. According to a report on erectile dysfunction medication abuse in the Current Drug Abuse Review in 2015, only 4 percent of the 7,000 internet pharmacy sites were in proper compliance based on the Verified Internet Pharmacy Sites Program year (Prostate.net, 2015). As such, people who ordered these medications from online pharmacies faced the possibility of receiving contaminated, expired, fake, and ineffective medication.

There are millions of counterfeit ED drugs that are used globally each year (Prostate.net, 2015). The counterfeit drug market is worth about \$200 billion and up to 15% of all medication sold around the world and especially online, are fake. In the study conducted by Gebreyohannes *et al.* (2016), the participants provided that they could easily access PDE5 inhibitors drugs without a prescription and often obtain them through friends. Bechara *et al.* (2010) indicated that 75.4% of the recreational EDM users acquired them from a friend, 17.4 % from a pharmacy or drugstore without a medical prescription, 4.3% prescribed by a physician, and 2.9% through the internet.

### **2.4.3 Concomitant Drug Use**

Cigarette smoking and other substance use have been significantly associated with the use of erectile dysfunction medication and other sexual enhancers. Harte and Meston (2012) identified that cigarette smoking was associated with increased prevalence of ED and use of EDMs. Gebreyohannes *et al.* (2016) indicated that the students who smoked were 5.15 times more likely to use PDE5 inhibitors compared to their non-smoking counterparts. Fisher *et al.* (2006) identified that ecstasy is mostly associated with Viagra use in older men while younger Viagra users mostly used Rohypnol followed by ketamine. The study also identified that MSM Viagra

user is most likely to use ketamine, ecstasy, and amphetamine while heterosexual Viagra users mostly use crack and Rohypnol. The authors indicated that heterosexual men who used Viagra were more likely to report a history of drug treatment.

Romanelli and Smith (2004) conducted a study to determine the concurrent use of Viagra with other club drugs and/ or antiretroviral medication. They concluded that an untoward effect was likely to occur when sildenafil was used concurrently with various club drugs like butyl and amyl nitrites. Korke *et al.* (2008) revealed that among the 9% who reported the use of PDE5 inhibitors, 71.4% had mixed them with alcohol. Harte and Meston (2011) identified that most recreational EDM users reported mixing EDMs with illicit drugs. They identified that approximately half of the recreational EDM users reported concomitantly mixing EDMs with alcohol and/or illicit substances. The most common of which were alcohol, marijuana, ecstasy, cocaine, and methamphetamines.

These findings were similar to other studies examining patterns of recreational drug and EDM use in young men (Musacchio *et al.*, 2006). A worrisome finding was that a sizable proportion (15%) of the sample reported mixing alkyl nitrites (poppers) with EDMs, a practice that is medically contraindicated as it may increase the risk of potentially fatal cardiovascular complications. Another article published in Elsevier Health Sciences provided that 54% of PDE5 inhibitor users mixed them with other drugs to enhance the sexual experience. A study reported that 36 % of all Sildenafil users combined its use with other drugs, including methamphetamines 23%, ecstasy 18%, poppers 15%, ketamine 11%, and GHB 8% (Elsevier Health Sciences, 2005).

#### **2.4.4 Risky Sexual Behaviors**

There is mounting evidence indicating that men who recreationally use PDE5 inhibitors and sex enhancers engage in risky sexual behaviors. According to Harte and Meston (2011), the PDE5 inhibitor users reported high rates of unprotected intercourse with individuals with unknown or serodiscordant HIV status. Although the rates varied according to sexual activity, they were all high including 35% vaginal intercourse, 73% receptive anal intercourse, and 63% penetrative anal

intercourse. Several studies examining rates of unprotected anal sex with a partner of unknown or differing HIV serostatus in men have reported similar results (Swearingen & Klausner, 2005). These studies established an increase in unprotected anal sex with a partner of unknown or serodiscordant HIV status among sildenafil users. The recreational users were between two and six times more likely to engage in risky behavior.

The odds of recreational EDM users being more sexually unrestricted were higher compared to nonusers. Specifically, men who recreationally used EDMs reported significantly higher numbers of lifetime sexual partners as well as higher numbers of one-night stands. Men reporting more than 50 sex partners and more than 5 ‘one-night stands’ were approximately 10 and 7 times as likely to recreationally use EDMs, respectively (Harte & Meston, 2011). The findings were in line with a study conducted by Gebreyohannes *et al.* (2016) which demonstrated that more sexual partners were significantly associated with PDE5 inhibitor use. Prestage *et al.* (2009) also reported that the association between drug use and increased risk of infection was strongest for drugs especially used to enhance sexual behavior.

## **CHAPTER THREE**

### **MATERIALS AND METHODS**

#### **3.1 Study Site**

The study was conducted at Jomo Kenyatta University College of Agriculture and Technology, main campus, a public university in Kenya, situated in Juja. This is in Thika district, 36 kilometers North East of Nairobi, along the Thika superhighway. It offers courses in Technology, Engineering, Science, Architecture, and Building sciences. The university has a strong research interest in the areas of biotechnology and engineering. JKUAT was randomly selected from a list of universities in Kenya.

#### **3.2 Study Population**

The study population consisted of 420 and 48 (for surveys and focus group discussions respectively) male undergraduate students aged 18-35 years from JKUAT main campus in Juja, Thika District who willingly accepted to participate in the study.

#### **3.3 Inclusion and Exclusion Criteria**

##### **3.3.1 Inclusion criteria**

- Male undergraduate students aged 18-35 years.
- Willingness to participate in the study.

##### **3.3.2 Exclusion criteria**

- Male undergraduate students older than 35 years.
- Male undergraduate students aged 18-35 years who were not in session during the data collection period.

### **3.4 Study Design**

A mixed-method study design, particularly the concurrent nested design was used. It adopted an analytical cross-sectional quantitative study design (through self-administered questionnaires) and a concurrent qualitative study (through Focus Group Discussions). The questionnaires and Focus Group Discussions (FGDs) were The quantitative method (questionnaire) is the primary method that guides the project while the qualitative method (focus group discussions) is the secondary method that is nested and provides a supporting role. The concurrent qualitative study was used to address the lifestyle, individual, socio-cultural, and structural factors that influence the use of EDMs and sexual enhancers among male undergraduate students at JKUAT.

### **3.5 Sampling**

#### **3.5.1 Quantitative Data**

Simple random sampling was used to obtain the required number of respondents from the sampling frame (Targeted population- total number of all-male undergraduate students at JKUAT main campus) using SPSS as explained in the recruitment strategy. The randomly selected students were traced through their Faculties / Departments / Courses using their class representatives.

#### **3.5.2 Qualitative Data**

Convenient sampling through the snowballing technique was used to obtain the students to be included in the Focus Group Discussions. In this case, the initial participants who were convenient to the researcher helped to recruit more subjects for the study. The participants included male students at JKUAT.

#### **3.5.3 Recruitment strategies**

A probability proportion to size sampling strategy was used to select the participants. The 422 sample size was divided among the five colleges in JKUAT Juja using the

probability proportional to size approach. Depending on the number of students that were in session during the data collection process, each college was allocated its total sample size. The sample was then randomly selected using SPSS. I created a variable referred to as Student ID in the variable view. The list had the total number of students in the sampling frame from which I sought to select 422 participants. In the Data View, I keyed in the student identification number from each college. For instance, from the College of Engineering Technology, I needed 87 students out of 2069 students. Therefore, from the menu, I chose Data, then Select Cases. Under Select, I chose Random sample of cases, then clicked on sample button. I then selected Exactly 87 from the first 2069 students. Under the output, I copied the selected cases to a new dataset saved as COTEC-simple-random-selected. I repeated the process of the other colleges until I got the total number of students needed for the study. The randomly selected students were traced through their departments using their class representatives. Convenient sampling using the snowballing technique was used to recruit the students that participated in the focus group discussions (FGDs). The participants in the FGDs included both EDM and non-EDM users to provide their experiences with these medications. They also provided in-depth responses required to explore the phenomenon. Older students who had a good understanding of the university lifestyle and how it influenced risky healthy behaviors were also included in the FGDs as well as younger students to help differentiate their perceptions and experiences with EDMs and/or sexual enhancers and risky sexual behavior.

### **3.6 Sample Size determination**

The quantitative sample size was determined using Fischer et al. (Mugenda, 1999)

formula.

$$\underline{n} = \frac{Z^2 pq}{d^2}$$



Where n=Desired sample size

Z =Standard Normal deviation (1.96 for a 95% confidence level)

P = the proportion of the population having the characteristic being measured  
(assuming 50% of the population uses EDMS and sexual enhancers)

q = 1-p

d=degree of accuracy will be set at 0.05

$$n = \frac{1.96^2 \cdot 0.5(0.5)}{0.05^2}$$

n = 384 + 10% non-responsive

n=422.

### **3.7 Data Collection**

#### **3.7.1 Training Research Assistants**

Two research assistants were trained to equip them with the ethical principles and skills to conduct data collection. They were guided through research ethics, the process of conducting informed consent, participant recruitment procedures, handling of electronic gadgets in data collection, conducting focus group discussions and administering questionnaires, as well as qualitative and quantitative data management. The research assistants helped in the process of obtained informed consent, administering and collecting the completed questionnaires. They also helped in coordinating FGDs and recording these discussions for analysis.

#### **3.7.2 Quantitative Data**

Self-administered questionnaires were used to collect quantitative data. All the students who consented were issued with the self-administered questionnaires at their

most convenient and appropriate time. The questionnaires were administered on campus or in any of the classrooms, depending on where the study participants were the most comfortable. The questionnaire had various parts including the demographics section, the utilization, the acquisition, and the factors associated with the utility of the EDMs and sexual enhancers. The time taken to complete the questionnaire was approximately 20 minutes.

### **3.7.3 Qualitative Data**

The focus group discussions (FGDs) were used to get qualitative data that provided in-depth information on the subject matter, especially the lifestyle, individual, structural, and socio-cultural factors that influence the use of sexual enhancers and EDMs among university students. Four audio-recorded Focus Group Discussions were conducted with 12 participants each. The FGDs aimed to understand if there are any changes in the group dynamics regarding the lifestyle, structural, individual, and sociocultural factors that influence the use of sexual enhancers and EDMs among university students. The focus group discussions were conducted on campus and any of the classrooms, depending on where the study participants were the most comfortable. These discussions took a maximum of two hours. The number of FGDs were guided by data saturation. One FGD was conducted each week for one month.

## **3.8 Data Analysis**

### **3.8.1 Quantitative Data**

The completed questionnaires were checked for completeness. The collected data was codes, entered into the computer, and analyzed using SPSS. All variables were subjected to descriptive data analysis. Descriptive statistics such as mean, standard deviation, and range were used to summarize continuous variables while proportions were summarized using proportions. In SPSS, several assessments were used to obtain the required outcomes including descriptive statistics. Bivariate analysis was conducted to determine the relationship between the use of the EDMs and/or sexual enhancers and all variables using Pearson's chi-square test. Factors that were found

to be associated with the outcome at P-value less than 0.05 were considered for multivariate analysis. Binary logistic regression analysis was used in the multivariate analysis to determine factors predictive of EDMs and/or sexual enhancers' use. Three successive iterations were performed using the backward condition method retaining four factors, adjusting for other factors, and keeping them constant. A P-value of less than 0.05 was considered significant.

### **3.8.2 Qualitative Data**

The data from focus group discussions (FGDs) were first transcribed before coding it according to themes using Nvivo software. The research questions were reviewed for easier reference in the Nvivo software. After transcription, the responses were grouped to each question for easier analysis. A few transcripts were read and summarized in a linked memo. The summarized memos were reviewed to help create a research journal and develop a coding strategy. The emerging themes were coded by selecting interesting text and dragging it onto the code. The connection between the emerging themes was established and grouped together into a hierarchy to help stay organized and focused.

### **3.9 Ethical Considerations**

Approval to carry out the study was sought from the Scientific and Ethics Review Unit (SERU), (Study SERU No. 3800). Furthermore, all the participants filled out a consent form to ensure that they voluntarily enroll in the study.

#### **3.9.1 Consenting process**

The study participants who consented were enrolled in the study. The consenting process happened before administering the questionnaires or FGDs. The research assistants guided the study participants through the consenting process. It involved informing each participant of the purpose of the study, the procedure to be undergone, and the potential risks and benefits of participation. The goal was to ensure that the participants got sufficient information about the study to help them make an informed decision about whether or not to enroll in the study. They then

signed the statement of consent document to indicate that they had understood what the study was all about and they voluntarily enrolled in it. Consent was discussed on campus or in one of the classrooms depending on where the participants felt the most comfortable.

### **3.9.2 Privacy and confidentiality**

Confidentiality and privacy were highly maintained and all data collected by the researcher was protected. After the data had undergone transcription, it was stored on the primary investigator's laptop with the access passcode only known to the researcher. The tape-recorded information, informed consent form, list of the participants, and other written notes were locked in an office that only the researcher can access. The anonymity of the research participants was maintained by using alphanumeric identifiers that protect their identity. The responses from the interview were not intended to collect specific data about persons but to be able to make generalizations and identify common themes or trends. The analyzed data was published in academic journals. However, the reports did not contain any information that would make it likely to identify the participants.

### **3.9.4 Risks and Benefits of the Study**

#### **3.9.4.1 Potential Benefits of the Study**

There were no tangible benefits for the participants at the time of data collection. However, reporting about their experiences had an advantageous effect on them since they had a moment of reflection on their experiences to help support the reproductive and sexual health agenda.

#### **3.9.4.2 Potential Risks of the Study**

There were risks involved in participating in the research. However, reflecting on some of the experiences regarding the use of these drugs may have caused some discomforts or psychological distresses. The researcher's empathy and compassion

helped in minimizing these discomforts. A primary physician was on fallback to provide any counseling if need be.

### **3.9.5 Results dissemination to the participating institution and other stakeholders**

A research summary document was sent to the participating institution. The document included the key findings well-articulated in key points to guide the readers to more complete information in a subsequent paragraph. The findings were also published in peer-reviewed, highly technical journal and presented in seminars.

## **CHAPTER FOUR**

### **STUDY RESULTS**

#### **4.1 Introduction**

This chapter presents the study findings based on both qualitative and quantitative data. A total of 420 participants responded to the questionnaires while a total of 48 participants were included in the FGDs.

#### **4.2 Quantitative Results**

##### **4.2.1 Characteristics of the study population**

The mean age of the participants was  $21.7 \pm 2.03$  ranging between 18 and 35 years. The majority of the respondents 65.0% (n=273) were single, followed by in a relationship (24.8 %, n=104). The rest were unspecified (8.6%, n=36), engaged (1.0%, n=4), and married (0.7%, n=3).

Analysis of religion affiliation that revealed majority (75.7%, n=318) to be Christians followed by Muslims (14.3%, n=60), and others (10.0%, n=42). Among the participants, (51.9%, n=218) were from middle income households, (24.3%, n=102) from low income households, (16.2%, n=68) from unspecified, and (7.4%, n=31) from high-income households.

Analysis of the place of origin indicated that (48.8%, n=205) were from semi-urban areas, (26.2%, n=110) from rural areas, and (25.9, n=105) from urban areas. Among the study participants (23.6%, n=99) were from the College of Human Resource Development, (21.2%, n=89) from the College of Pure and Applied Sciences; (20.7%, n=87) from the College of Engineering and Technology, (17.4%, n=73) from the College of Agriculture and (17.1%, n=72) from the College of Health Sciences.

The findings also revealed that (29.5%, n=155) were in 3<sup>rd</sup> year, (29.5%, n=124) were in 2<sup>nd</sup> year; (21.7%, n=91) were in 4<sup>th</sup> year, (6.2%, n=26) were in 1<sup>st</sup> year; and

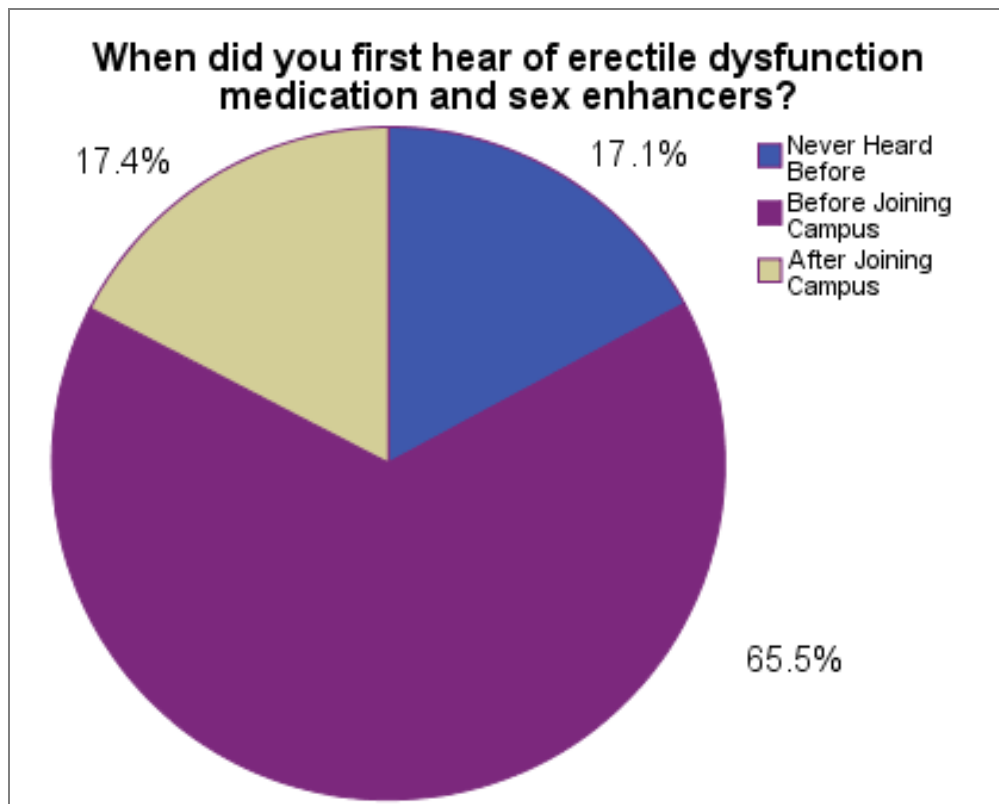
(5.7%, n=24) were in 5<sup>th</sup> year. Among the participants, (70.5%, n=296) were living outside campus, while (27.5%, n=124) were residence on campus.

**Table 4.1: Socio-demographic characteristics of the study participants (n=420)**

<b>Variable</b>	<b>Value</b>
<b>Age(yr)</b>	<b>21.7(±2.03)</b>
Relationship status	
Single	273 (65.0%)
In a relationship	104 (24.8%)
Married	3 (0.7%)
Engaged	4 (1.0%)
Unspecified	36 (8.6%)
Religion	
Christian	318 (75.7%)
Muslim	60 (14.3%)
Other	42 (10.0%)
Socioeconomic Status	
Low Income	102 (24.3%)
Middle Income	218 (51.9%)
High Income	31 (7.4 %)
Unspecified	68 (16.2 %)
Place of Origin	
Rural	110 (26.2%)
Semi-urban	205 (48.8%)
Urban	105 (25.9%)
College	
Health Sciences	72 (17.1%)
Pure and Applied Sciences	89 (21.2 %)
Agriculture	73 (17.4 %)
Engineering and Technology	87 (20.7 %)
Human Resource and Development	99 (23.6%)
Year of Study	
1 <sup>st</sup> Year	26 (6.2%)
2 <sup>nd</sup> Year	124 (29.5 %)
3 <sup>rd</sup> Year	155 (36.9%)
4 <sup>th</sup> Year	91 (21.7%)
5 <sup>th</sup> Year	24 (5.7%)
Residence	
Resident on Campus	124 (29.5 %)
Non-resident	296 (70.5 %)

#### 4.2.2 Knowledge of EDMs and Sex Enhancers

Out of the 420 respondents, (65.5%, n=275) had learned about sexual enhancers and erectile dysfunction medication before joining campus; (17.4%, n=73) had learned about them after joining campus, and (17.1%, n=72) had never heard of them before. (Figure 4.1).



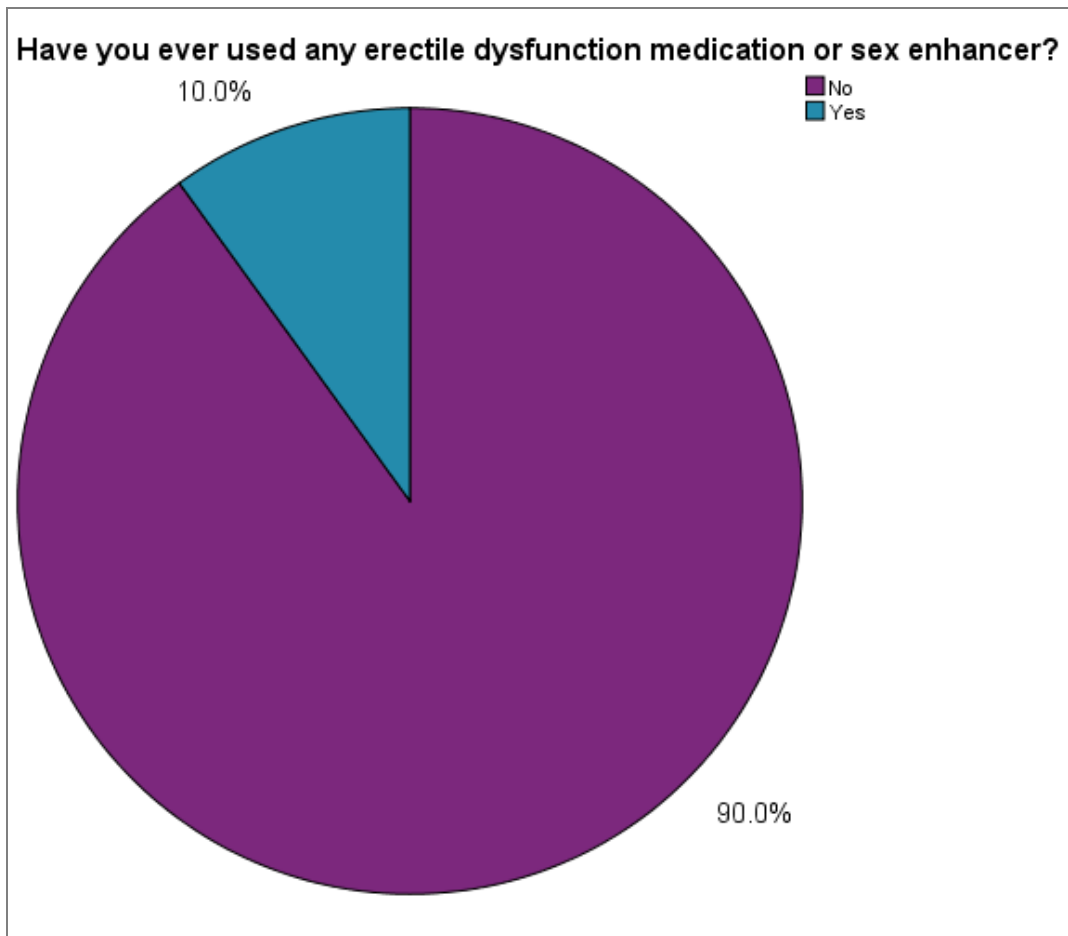
**Figure 4.1: Knowledge of EDM and Sex Enhancers**

#### 4.2.3 EDMs and Sexual Enhancers Use

##### 4.2.3.1 Use of EDMs and Sexual Enhancers

Out of the 420 study respondents, 10.0% (n=42) reported that they had used erectile dysfunction medication and/or sexual enhancers at least once, while the remaining 90.0% (n=378) had not (Figure 4.2).

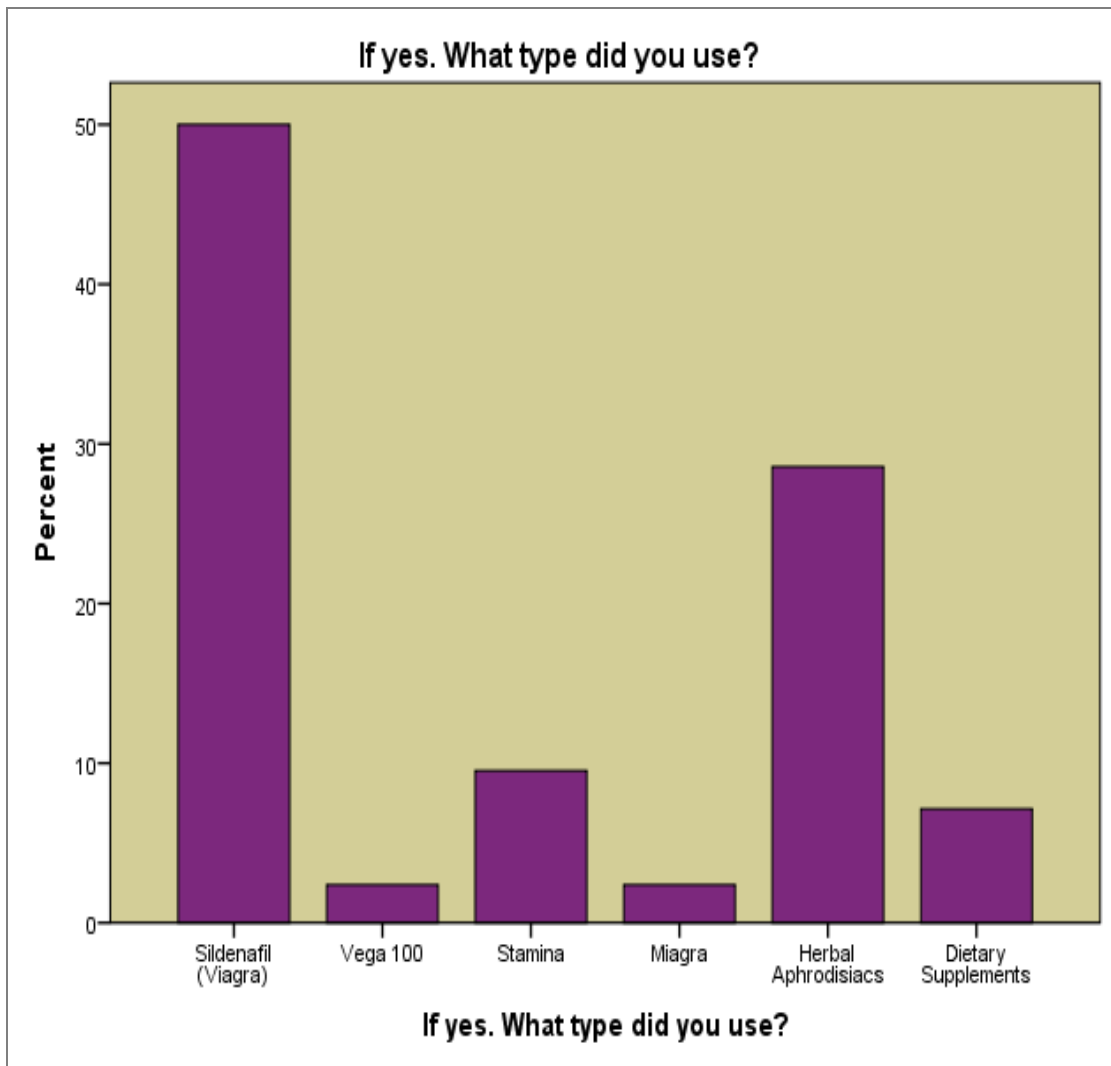




**Figure 4.2: Use of EDMs and Sexual Enhancers**

#### **4.2.3.2 Types of EDMs and Sexual Enhancers Used**

Out of the 42 respondents who indicated that they had used sexual enhancers and/or EDMs, 50.0% (n=21) had used Viagra, 28.6% (n=12) had used herbal aphrodisiacs; 9.5% (n=4) had used Stamina; 9.5% (n=3) had used dietary supplements; 2.4% (n=1) had used Miagra; and 2.4% (n=1) had used Vega 100 (Figure 4.3).



**Figure 4.3: Types of EDMs and/or Sexual Enhancers Used**

#### **4.2.3.3 Sources of Information about EDMs and Sexual Enhancers**

Out of the 42 study participants that reported use of EDMs and/or sexual enhancers, 40.5% (n=17) mentioned a friend as their source of information about them, 40.5% (n=17) mentioned the Internet/Social Media; 9.5% (n=4) mentioned mainstream media; and 9.5% (n=4) mentioned night clubs (Table 4.2).

**Table 4.2: Sources of Information about EDMs and sexual enhancers**

<b>Sources of Information about EDMs and sexual enhancers</b>	<b>(Total=42)</b>	<b>%</b>
Friend	17	40.5%
Mainstream Media	4	9.5 %
Internet/Social Media	17	40.5%
Night Clubs	4	9.5 %

#### **4.2.3.4 Frequency of EDMs and Sexual Enhancers Use during Intercourse**

Regarding the frequency of EDMs and/or sexual enhancers use during intercourse, 57.1% (n=24) reported that they use them rarely (less than half the time); 31.0% (n=13) reported that they use them sometimes (half the time), and 11.9% (n=5) reported that they use them often (more than half the time) (Table 4.3).

**Table 4.3: Frequency of EDMs and sexual enhancers use during intercourse**

<b>Frequency of EDMs and sexual enhancers use during intercourse</b>	<b>(Total=42)</b>	<b>%</b>
Rarely (less than half the time)	24	57.1%
Sometimes (half the time)	13	31.0%
Often (more than half the time)	5	11.9%

#### 4.2.3.5 Knowledge of the dosage for EDMs and/or Sexual Enhancers

Out of the 42 respondents who reported the use of EDMs and/or sexual enhancers, 26.6% (n=12) reported that they know the dosage of the EDMs or sexual enhancers that they used while 71.4% (n=30) did not know.

#### 4.2.3.6 Motivation for EDM and/or sexual enhancers use

Responses on motivation varied across six choices among the 42 who reported the use of EDMs and/or sexual enhancers. 26.2% (n=11) used them to increase erectile sensation; 21.4% (n=9) out of curiosity; 21.4% (n=9) to impress or satisfy partner; 16.7% (n=7) to enhance self-esteem; 7.1% (n=3) to increase libido; and 7.1% (n=3) to increase rigidity (Table 4.4).

**Table 4.4: Motivation for EDM and sexual enhancer use**

<b>The Motivation for EDM and sexual enhancer use</b>	<b>Total=42</b>	<b>%</b>
Curiosity	9	21.4 %
To increase libido	3	7.1%
To satisfy or impress partner	9	21.4%
To enhance self-esteem	7	16.7%
To increase erectile sensation	11	26.2%
To increase rigidity	3	7.1%

#### 4.2.3.7 Combining EDMs/Sexual Enhancers with illicit drugs

Majority of the study participants who used EDMs/sexual enhancers 78.6% (n=33) reported that they have combined them with illicit drugs while 21.4% (n=9) reported that they did not.

#### 4.2.3.8 Illicit Drugs Used

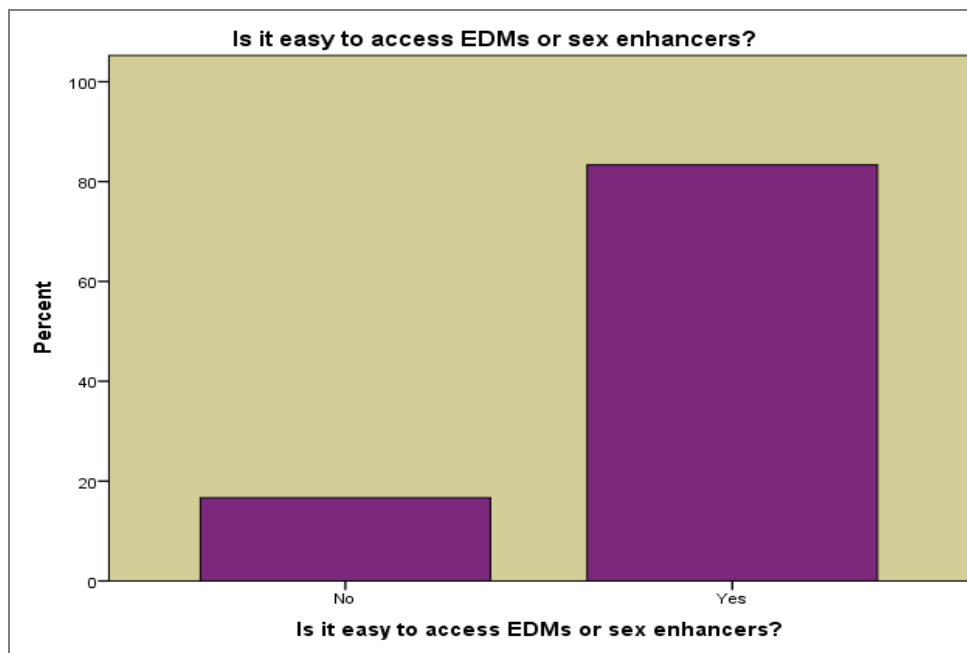
Among the 33 (78.6%) study participants that used illicit drugs concomitantly with the EDMs and/or sexual enhancers, 73.8% (n=31) used alcohol; 26.2% (n=11) marijuana; 14.3% (n=6) khat; 11.9% (n=5) cigarette; and 4.8% (n=2) cocaine (Table 4.5).

**Table 4.5: Illicit Drugs Used**

<b>Illicit Drugs Used</b>	<b>Total=33</b>	<b>%</b>
Alcohol	31	73.8%
Khat	6	14.3%
Marijuana	11	26.2%
Cocaine	2	4.8%
Cigarette	5	11.9%

#### 4.2.3 Access to EDMs and/or sexual Enhancers

From the findings, 83.3% (n=35) of the study participants who use EDMs and/or sexual enhancers mentioned that it is easier to access them while 16.7% (n=7) mentioned that it is not (Figure 4.4).



**Figure 4.4: Access to EDMs and/or sexual Enhancers**

#### 4.2.3.10 Sources of EDM and/or sexual enhancers' acquisition

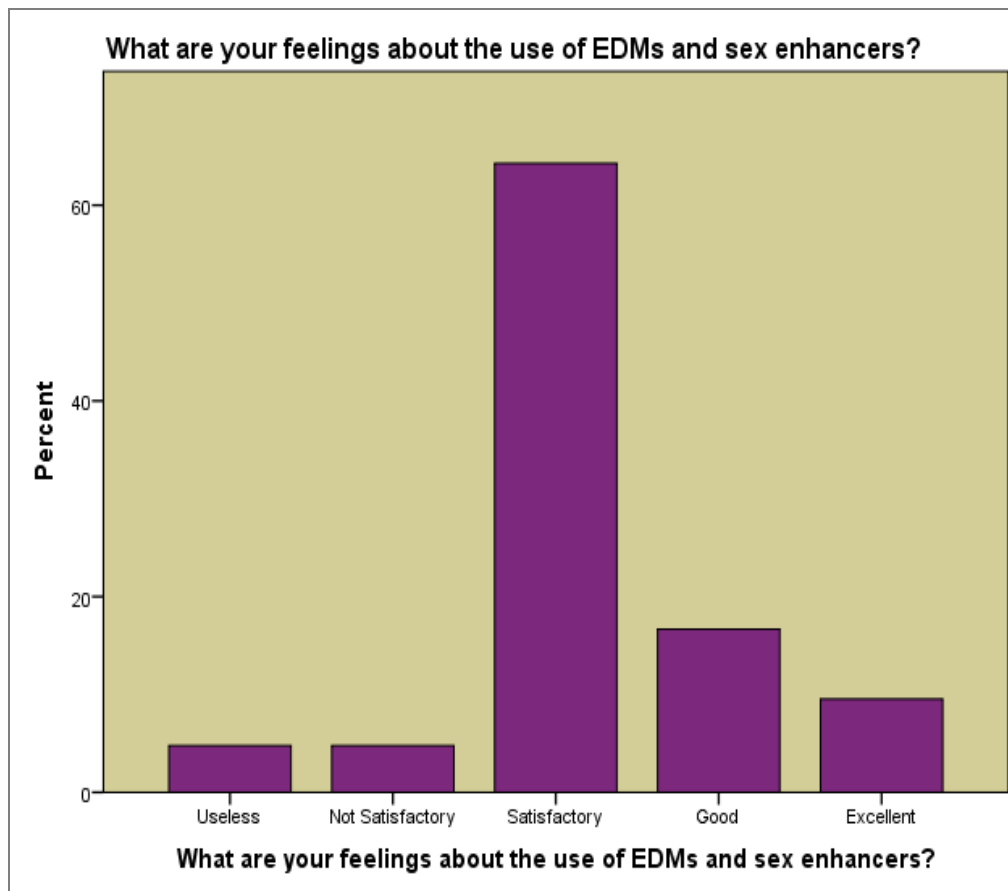
Sources of acquisitions were assessed using the following variants: 33.3% (n=14) acquired them from a friend; 23.8% (n=10) online pharmacies; 21.4 (n=9) night clubs; 11.9% (n=5) pharmacies with no prescription; 4.8% (n=2); pharmacies with prescription; and 4.8 (n=2) got them from other sources (Table 4.6).

**Table 4.6: Sources of EDM and/or sexual enhancers' acquisition**

Sources of EDM and/or sexual enhancers' acquisition	Total=42	%
A friend	14	33.3%
Night Clubs	9	21.4%
Pharmacies with no prescription	5	11.9%
Pharmacies with prescription	2	4.8%
Online pharmacies/social media	10	23.8 %
Others	2	4.8%

#### 4.2.3.11 Feelings about EDMs and sexual enhancers use

Out of the study participants that used EDMs and/or sexual enhancers, 64.3 % (n=27) felt that they are satisfactory; 16.7% (n=7) felt that they are good; 9.4 % (4) felt that they were excellent; 4.8% (n=2) felt that they were not satisfactory; 4.8% (n=2) felt that they were useless (Figure 4.5).



**Figure 4.5: Feelings about EDMs and/or sexual enhancers**

#### 4.2.3.12 Side Effects Experienced

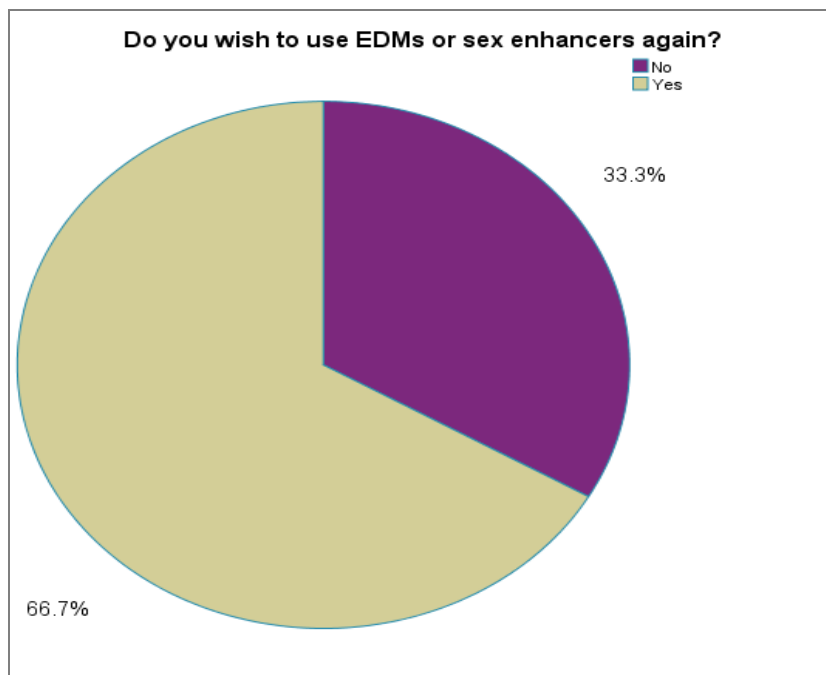
The study participants mentioned the major side effects after taking the EDMs and/or sexual enhancers as 40.5% (n=17) headache; 21.4% (n=9) dizziness; 16.7% (n=7) longer erections than expected; 14.3% (n=6) sensitivity to light; 4.8% (n=2) flushing; and 2.4% (n=1) blurred vision (Table 4.7).

**Table 4.7: Side effects experienced**

Side effects experienced	Total=42	%
Headache	17	40.5%
Dizziness	9	21.4%
Flushing	2	4.8%
Blurred vision	1	2.4%
Sensitivity to light	6	14.3%
Longer erections than wanted	7	16.7%

**4.2.3.13 Wish to Use EDMs and/or sexual enhancers again**

Majority of the study participants who had used EDMs and/or sexual enhancers 66.9% (n=28) wished to use them again while 33.3% (n=14) did not (Figure 4.6).



**Figure 4.6: Wish to use EDMs and/or sexual enhancers again**



#### **4.2.4 Sexual Behavior**

Assessment of the study participant's sexual behavior was probed using five questions. On the number of sexual partners in the past six months, 28.7% (N=119) of the study participants reported that they have had 2 sexual partners followed by 25.5% (n=107) who reported having had 3-5 sexual partners. On the number of sexual partners in the study participants' lifetime, the majority 60.7% (n=255) reported that they have had 1-10 sexual partners, followed by 35.0% (n=147) who reported 11-20 sexual partners. On the number of 'one-night stands', 31.0% (n=134) reported that they have never had any 'one-night stand,' 27.9% (n=117) mentioned that they have had 1, while 26.7% (n=112) mentioned that they have had 2-5. From the findings, 50.5% use of condom or know the partner's HIV status before intercourse; 36.7% (n=154) do it sometimes; and 12.9% (n=54) do not do it. Regarding engaging in unprotected sex while showing symptoms of an STI, the majority of the study participants 86.7% (n=364) mentioned that they have not while the rest have (Table 4.8).

**Table 4.8: Sexual Behavior**

Sexual Behavior	Total=420	%
Number of sexual partners in the past six months		
0	97	23.1%
1	79	18.8%
2	119	28.3 %
3-5	107	25.5%
More than 5	18	4.3%
Number of sexual partners all through your life		
1-10	255	60.7%
11-20	147	35.0%
21-30	18	4.3%
Number of 'one-night stands'		
0	134	31.9%
1	117	27.9%
2-5	112	26.7%
More than 5	57	13.5%
Use of condom/knowledge of partner's HIV status before intercourse		
No	54	12.9%
Yes	212	50.5%
Sometimes	154	36.6%
Engaging in unprotected sex while showing symptoms of an STI		
No	364	86.7%
Yes	56	13.3%

#### 4.2.5 Independent T-test for Age

There was a significant difference in the mean age of users and non-users ( $t_{418} = 4.217$ ,  $p < 0.001$ ). The mean age for users was 1.37 [95 % CI 0.729-2.001] higher than the mean age for non-users (Table 4.9).

**Table 4.9: Association between age and EDM and/or sexual enhancers use**

t	df	mean difference	95% CI		p-value
			Lower	Upper	
4.217	418	1.365	0.729	2.001	<0.001

#### 4.2.6 Bivariate Analysis

##### 4.2.6.1 Socio-demographic characteristics

Bivariate analysis indicated that most of the socio-demographic factors (relationship status, socioeconomic status, place of origin, college, and residence) were not associated with EDM or sexual enhancers' use. However, religion showed ( $P=0.006$ ). A minority of the Muslim students (1.7%,  $n=1$ ) were using EDMs or sexual enhancers compared to Christians (81.0%,  $n=34$ ) or otherwise (16.7%,  $n=7$ ). The findings indicated that Muslim students were 5.021 [95% CI= 0.797- 31.616] times less likely to use EDMs or sexual enhancers compared to other religions. The year of study also demonstrated an association. For instance, minority of 1<sup>st</sup> year students (2.4%,  $n=1$ ) were using EDMs or sexual enhancers users compared to 2<sup>nd</sup> year students (19.0%,  $n=2$ ); 3<sup>rd</sup> year students (33.3%,  $n=14$ ); 4<sup>th</sup> year students (23.8%,  $n=10$ ); and 5<sup>th</sup> year students (21.4%,  $n=9$ ). First-year students were 6.250 [ $P=0.003$ , 95% CI=1.725- 40.749] less likely to use EDMs and/or sexual compared to fifth-year students. Second-year students were 1.882 [ $P<0.001$ , 95% CI= 1.132 - 3.127] less likely to use EDMs and/or sexual enhancers compared to fifth-year students.

Third-year students were 1.485 [P<0.001, 95% CI= 1.066-2.069] times less likely to use EDMs and/or sexual enhancers than fifth-year students. Fourth-year students were 1.603[P= .002, 95% CI= 1.037-2.477) times less likely to use EDMs than fifth-year students (Table 4.10)

**Table 4.10: EDMs and sexual enhancers use in relation to socio-demographic factors**

Variables	Used EDMs		Did not use EDMs		OR	95%CI of O.R		P-value
	n= 42		n=378			Lower	Upper	
	N	%	N	%				
Relationship								
Single	24	(57.1%)	249	(65.9%)	1.297	.423	3.977	.649
In a relationship	13	(31.0%)	91	(24.1%)	0.967	.728	1.285	.826
Married	1	(2.4%)	2	(0.5%)	.294	.032	2.679	.269
Engaged			4	(1.1%)	.889	.792	.998	.482
Unspecified	4	(9.5%)	32	(8.5%)	Ref			
Religion								
Christian	34	(81.0%)	284	(75.1%)	1.074	.689	4.052	.252
Muslim	1	(1.7%)	59	(98.3%)	5.021	.797	31.616	.006
Other	7	(16.7%)	35	(83.3%)	Ref			
Socio-economic status								
Low Income	10	(23.8%)	92	(24.3%)	.950	.636	1.419	.807
Middle Income	19	(45.2%)	199	(52.6%)	.999	.794	1.259	.996
High Income	7	(16.7%)	24	(6.3%)	.512	.279	.941	.056
Unspecified	6	(14.3%)	63	(16.7%)	Ref			
Place of origin								
Urban	10	(23.8%)	95	(25.1%)	1.138	.699	1.853	.586
Semi-urban	19	(45.2%)	186	(49.2%)	1.107	.539	1.322	.475

Rural	13 (31.0%)	97 (25.7%)	Ref			
College						
Pure and Applied Sciences	5 (11.9%)	84 (22.2%)	1.353	.683	2.682	.324
Agriculture	6 (14.3%)	67 (17.7%)	1.100	.597	2.025	.751
Engineering and Technology	10 (23.8%)	72 (19.0%)	.893	.582	1.371	.625
Human Resource and Development	14 (33.3%)	90 (23.8%)	.871	.626	1.212	.452
Health Sciences	7 (16.7%)	65 (17.2%)	Ref			
Year						
1 <sup>st</sup> Year	1 (2.4%)	25(6.6%)	6.250	1.725	40.749	.003
2 <sup>nd</sup> Year	8 (19.0%)	116 (30.7%)	1.882	1.132	3.127	<.001
3 <sup>rd</sup> Year	14 (33.3%)	141 (37.3%)	1.485	1.066	2.069	<.001
4 <sup>th</sup> Year	10 (23.8%)	81 (21.4%)	1.603	.170	.641	.002
5 <sup>th</sup> Year	9 (21.4%)	15 (4.0%)	Ref			
Residence						
Resident on Campus	12 (28.6%)	112 (29.6%)	1.880	.477	7.410	.340
Non-resident	30 (71.4)	266 (70.4%)	Ref			

#### 4.2.6.2 Sexual Behavior

Bivariate analysis showed a significant relationship between EDM use and sexual behavior. The students who had more sexual partners in the past six months were more likely to use the EDMs and/or sexual enhancers. The findings indicated that students with lower sexual partners within the past 6 months were less likely to use EDMs and/or sexual enhancers. For instance, those who had 0 sexual partners (7.1%, n=3) had used EDMs compared to those who had 1 sexual partner (4.8%, n=2); those who had had 2 sexual partners (19.0%, n=8); those who had 3-5 sexual partners (47.6%, n=20); and those who had more than 5 sexual partners (21.4%, n=7).

Those who had 0-10 lifetime sexual partners that had used EDMs and sexual enhancers represented (31.0%, n=13); those who had 11-20 lifetime sexual partners represented (52.4%, n=22) of the EDMs users while those who had 21 or more sexual partners represented (16.7%, n=7) of the EDMs users. Those who reported no 'one-night' stands represented (9.5%, n=4) of the EDMs users; those who reported 1 'one-night stand' represented (14.3%, n=6) of the users; those who reported 2-5 'one-night' stands represented (26.2%, n=11) of the users; and those who reported more than 5 'one-night' stands represented (50.0%, n=21) of the users. Those who did not use a condom or had knowledge of the partner's status before intercourse represented (23.8%, n=10) of the users while those who did use a condom or knew the partner's status before intercourse represented (45.2%, n=19) of the users and those who sometimes used a condom or knew their partners' status before intercourse represented (31.0%, n=13) of the users. Those who had engaged in unprotected intercourse while showing signs of an STI represented (64.3%, n=27) of the users while those who had not represented (35.7%, n=15) of the users.

Students who reported no sexual partner in the past six months were 3.650 [P<0.001, 95%CI= 1.368-9.744] times less likely to use EDMs and/or sexual enhancers compared to those who reported more than 5 sexual partners. Those who reported 1 sexual partner in the past six months were 4.924 [P=<0.001, 95%CI= 1.403 - 17.286] times less likely to use EDMs or sexual enhancers compared to those who reported more than 5 sexual partners. Those who reported 2 sexual partners in the past six

months were 1.966 [P=<0.001, 95%CI= 1.184 -3.263] times less likely to use EDMs or sexual enhancers compared to those who reported more than 5 sexual partners. Those who reported 3 to 5 sexual partners in the past six months were 1.314 [P=<0.004, 95%CI= 1.021-1.691] times less likely to use EDMs or sexual enhancers compared to those who reported more than 5 sexual partners.

The respondents who reported 0-10 lifetime sexual partners were 1.472 [P=<0.001, 95% CI=1.066-2.032] times less likely to use EDMs and/or sexual enhancers compared to those who reported 21 and more lifetime sexual partners. Those who reported 11-20 lifetime sexual partners were 1.212 [P=<0.012, 95% CI=.981-1.497] times less likely to use EDMs and/or sexual enhancers compared to those who reported 21 and above lifetime sexual partners. Respondents who reported 0 ‘one-night’ stands were 4.895 [P=<0.001, 95 CI = 1.987-12.060] times less likely to use EDMs and/or sexual enhancers compared to those who reported more than 5 ‘one-night’ stands. Those who reported 1 ‘one-night’ stands were 3.398 [P=<0.001, 95% CI = 1.668-6.923] times less likely to use EDMs and/or sexual enhancers compared to those who reported more than 5 ‘one-night’ stands. Those who reported 2-5 ‘one-night’ stands were 3.398 [P=<0.001, 95% CI = 1.668-6.923] times less likely to use EDMs and/or sexual enhancers compared to those who reported more than 5 ‘one-night’ stands. Students who reported that they did not use a condom or have knowledge of a partner’s status before intercourse were 0.547 [P=0.042, 95%CI 0.321- 0.932] times more likely to use EDMs and/or sexual enhancers compared to those who sometimes used the condom or knew the partner’s status before intercourse. Respondents who reported not having engaged in unprotected sex while showing symptoms of an STI were 1.368 [P=0.010, 95% CI .979 -1.910] times less likely to use EDMs and/or sexual enhancers compared to those who reported having engaged in unprotected sex while showing STI symptoms (Table 4.11).

**Table 4.11: Sexual behavior**

Variables	Used EDMs		Did not use EDMs		OR	Lower	Upper	P-value
	n= 42		n=378					
	N	%	N	%				
No. of sexual partners in the past 6 months								
0	3 (7.1%)		94 (24.9%)		3.650	1.368	9.744	<0.001
1	2 (4.8%)		77 (20.4%)		4.924	1.403	17.286	<0.001
2	8 (19.0%)		111(29.3%)		1.966	1.184	3.263	<0.001
3-5	20 (47.6%)		87 (23.0%)		1.314	1.021	1.691	.004
More than 5		9 (21.4%)		9 (2.4%)			Ref	
No. of lifetime Sexual partners								
0-10	13 (31.0%)		242 (64.0%)		1.472	1.066	2.032	<0.001
11-20	22 (52.4%)		125 (33.1%)		1.212	.981	1.497	0.012
21 and above		7 (16.7%)		11 (2.9%)			Ref	
No. of 'one-night' stands								
0	4 (9.5%)		130 (34.4%)		4.895	1.987	12.060	<0.001
1	6 (14.3%)		111 (29.4%)		3.398	1.668	6.923	<0.001
2-5	11 (26.2%)		101 (26.7%)		2.145	1.315	3.497	<0.001
More than 5		21 (50.0%)		36 (9.5%)			Ref	
Use of a condom/knowledge of partners' status before intercourse								
No	0 (23.8%)		44 (11.6%)		.547	.321	.932	0.042
Yes	19 (45.2%)		193 (91.0%)		.973	.720	1.315	0.862
Sometimes		13 (31.0%)		141 (37.3%)			Ref	
Engaging in Unprotected sex while showing symptoms of an STI								
No	27 (64.3%)		337 (89.2%)		1.368	.979	1.910	0.010
Yes		15 (35.7%)		41(10.8%)			Ref	

#### 4.2.7 Multivariate Analysis

After adjusting for confounding factors, religion, no. of sexual partners in the past six months, no. of one night stands, and use of condom/knowledge of partners' status



before intercourse demonstrated a significant relationship between EDMs and/or sexual enhancers use. Muslim students were 0.058 [P=0.013, 95%CI= 0.006-0.545] times less likely to use EDMs and/or sexual enhancers compared to other religions.

There was a significant relationship between EDMs and/or sexual enhancers use and sexual behavior. Students who reported no sexual partner in the past six months were 0.133 [P=0.027, 95%CI= 0.022-0.797] times less likely to use EDMs or sexual enhancers compared to those who reported more than 5 sexual partners (an adjustment from 3.650). Those who reported 1 sexual partner in the past six months were 0.78 [P=0.008, 95%CI= .012-.513] times less likely to use EDMs or sexual enhancers compared to those who reported more than 5 sexual partners (an adjustment from 4.924). Those who reported 2 sexual partners in the past six months were 0.186 [P=0.019, 95%CI=0.046 - 0.759] times less likely to use EDMs or sexual enhancers compared to those who reported more than 5 sexual partners (an adjustment from 1.966).

Respondents who reported 0 'one-night' stands were 0.127 [P=0.003, 95% CI = 0.032-0.505] times less likely to use EDMs and/or sexual enhancers compared to those who reported more than 5 'one-night' stands (an adjustment from 4.895). Those who reported 1 'one-night' stands were 0.216 [P=0.008, 95% CI = 0 .070 - 0.671] times less likely to use EDMs and/or sexual enhancers compared to those who reported more than 5 'one-night' stands (an adjustment from 3.398). Those who reported 2-5 'one-night' stands were 0.300 [P=0.013, 95% CI = 0.116-0.773] times less likely to use EDMs and/or sexual enhancers compared to those who reported more than 5 'one-night' stands (an adjustment from 3.398). Students who reported that they did not use a condom or have knowledge of a partner's status before intercourse were 3.970 [P=0.011, 95%CI 1.379-11.427] times more likely to use EDMs and/or sexual enhancers compared to those who sometimes used the condom or knew the partner's status before intercourse (an adjustment from 0.547) (Table 4.12).

**Table 4.12: Binary Logistic Regression**

Predictor variables	$\beta$	S.E.( $\beta$ )	Df	Adjusted OR	95.0% C.I. for OR		P Value
					Lower	Upper	
Religion							
Christian	- 0.669	.525	1	.512	.183	1.434	.203
Muslim	-2.849	1.144	1	.058	.006	.545	.013
Other	Ref						
No. of sexual partners in the past 6 months							
0	-2.015	.912	1	.133	.022	.797	.027
1	-2.557	.964	1	.078	.012	.513	.008
2	-1.682	.717	1	.186	.046	.759	.019
3-5	-0.628	.618	1	.534	.159	1.793	.310
More than 5	Ref						
No. of 'one-night stands'							
0	-2.066	.706	1	.127	.032	.505	.003
1	-1.531	.578	1	.216	.070	.671	.008
2-5	-1.205	.482	1	.300	.116	.773	.013
More than 5	Ref						
Use of a condom/knowledge of partner's status before intercourse							
No	1.379	.539	1	3.970	1.379	11.427	.011
Yes	.518	.431	1	1.679	.722	3.908	.229
Sometimes	Ref						

### 4.3 Qualitative Results

#### 4.3.1 Socio-demographic characteristics

A total of 48 participants took part in the four FGDs conducted. The mean average of the study participants was 21 years ranging between 18 and 25 years. Most of the participants were aged between 21 and 22 years.

**Table 4.13: Distribution of FGDs study participants by age and year of study**

Age in years	Year of Study					Total
	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>	
18-20	8	5	1	-	-	14
21-22	4	5	5	3	2	19
23-25	-	2	6	3	4	15
Total	12	12	12	6	6	48

The majority of the study participants were Christians (30), followed by other religions (12) and the least were Muslims (6). Most of the participants were single (35) and few were in a relationship (13).

**Table 4.14: Distribution of FGDs study participants by religion**

Religion	Total
Muslims	6
Christians	30
Others	12
Total	48

### **4.3.2 Themes and responses**

Qualitative data was sorted manually according to themes. There were two main themes (attitudes and practices), which were further broken down into subthemes. Multiple responses emerged from the FGDs' participants (Appendix 5).

## CHAPTER FIVE

### DISCUSSIONS, CONCLUSION AND RECOMMENDATIONS

#### 5.1 Introduction

This chapter presents the discussion of the results and how they relate to the study's objectives. It also gives a conclusion of the study and makes recommendations.

#### 5.2 Discussion

##### 5.2.1. Prevalence of the EDMs and/or sexual enhancers use

The present study investigated the prevalence of the use of EDMs and/or sexual enhancers in a Kenyan population and established whether the use was recreational or medical as well as other factors associated with use. The findings demonstrated that EDMs and/or sexual enhancers were used by 10% (n=42) of the participants. Most of the EDM users consumed the drugs without a proper medical indication and prescription. The 10% prevalence is an indication that the recreational use of EDMs and/or sexual enhancers has become a problem in Kenya. The use of EDMs and sexual enhancers among young men without any medical indication leads to reduced confidence among users in gaining and holding erections without the EDMs and/or sexual enhancers. These findings were not consistent with the studies by Harte and Meston (2011) at 4%; Santtila *et al.* (2007) at 2.6 %; Gebreyohannes *et al.* (2016) at 5.5%; and Musacchio *et al.* (2006) at (6%). The prevalence is slightly higher for this study because it included both erectile dysfunction medications and other sexual enhancers while the other study primarily focused on EDMs, especially Viagra.

Shortly after Viagra was launched in 1998, researchers started reporting its recreational use among young men. For the last two decades, an increasing number of young men without a proper diagnosis of erectile dysfunction have been taking EDMs and other sexual enhancers aiming to increase their sexual performance. Korkes *et al.* (2008); Bechara *et al.* (2010); Harte & Meston (2012); and Freitas *et al.* (2012) have also reported the use of EDMs by young healthy men (especially college

students) without any medical indication. One of the major concerns regarding the purchase of EDMs without proper prescription from a physician is the lack of knowledge about the existing co-morbidities and contraindications.

### **5.2.2 Factors associated with the use of sexual enhancers and/or EDMs**

Factors associated with the use of sexual enhancers and/or EDMs among the students ( $P < 0.05$ ) were older students, not identifying with a religion, sexual risk behavior (high number of sexual partners in the past six months, a high number of sexual partners in life, a high number of ‘one-night’ stands, and unprotected sex), drinking alcohol, smoking marijuana, and using khat (miraa).

The findings further indicated that young male students use EDMs and/or sexual enhancers to increase erectile sensation (26.2%); out of curiosity (21.4%), and to impress a partner (21.4%). The findings were consistent with Gebreyohannes *et al.* (2016) who indicated that the young males used Viagra to increase erectile sensation. Further explanation regarding the use of EDMs to impress the partner emerged from the FGDs indicating:

*“In the current world of unstable relationships, most young men live in constant fear of their girlfriends walking out if sexual performance does not meet their sexual desires. Women openly criticize you if you underperform in the bedroom, you just have to seek help elsewhere when it is necessary.”*

The type of EDMs used include: Viagra at 50.0% ( $n=21$ ) and herbal aphrodisiacs at 28.6% ( $n=12$ ). Viagra is the most commonly used EDM and different studies conducted in Brazil Korkes *et al.* (2008); the United States-Fisher *et al.* (2006); the UK- Daskalopoulou *et al.* (2014); Spain- Garin *et al.* (2017); Vienna- Grabovac *et al.* (2018); and Ethiopia-Gebreyohannes *et al.* (2016) have primarily focused on Viagra. However, Prostate.com (2015) identifies other herbal aphrodisiacs and supplements that are being sold commercially. The following also emerged from the FGDs:

*“The blue pill, Viagra is the most common” “I also know of Vega 100, African Viagra, Alvoy, Enzoy, Cialis, and Mkhombero (an herbal aphrodisiac)”*

In this study, most of the users (64.3 %) indicated that they felt like the EDMs and/or sexual enhancers were ‘satisfactory’ regarding how they enhanced their sexual performance. These findings are consistent with a study conducted in Saudi Arabia by Alshahrani *et al.* (2016) who reported that 69.2% of the EDM users indicated that these drugs improved their sexual performance which manifested by increased erectile duration or enhanced erections.

From the study, 33.3% acquired EDMs from a friend; and 23.8% from online pharmacies. Only 4.8% of the users reported that they obtained the drugs from the pharmacies with a prescription from a physician. The findings corroborated the results by Gebreyohannes *et al.* (2016), which indicated that 56.5% of the participants indicated that they could access PDE5 inhibitors drugs easily through friends while others reported easy access to the EDMs as with other non-prescribed drugs. Bechara *et al.* (2010) indicated that 75.4% of the recreational EDM users acquired them from a friend while only 2.9% through the internet. The internet source was not as pervasive as it is now, hence, the sharp contrast from the present study which identifies the internet as a key source of acquisition. The following also emerged from the FGDs:

*“Currently, these drugs come cheap and with as little as Kshs 50, you can get one kind or the other. Like Enzoy is sold at Kshs.50 a sachet.”*

*“Some of these drugs and supplements are sold online. I have encountered a lot of business pages on Instagram and Facebook selling these products. In fact, Jumia also sells these pills to online shoppers.”*

The study indicated that 73.8% used alcohol and 26.2% used marijuana concomitantly with the EDMs and/or sexual enhancers. These results are consistent with the studies done by Pantalone, *et al.* (2008) as well as Gebreyohannes *et al.* (2016) who established that 71.5% of the EDM users preferred using them with alcohol and other illicit drugs. The following also emerged from the FGDs:

*“There is this notion that when one is really drunk, they may underperform sexually and some of us go for the blue pill to boost our confidence. When you smoke bhang, chew Miraa (khat), or use other drugs, you end up losing your manly strength. When you are too drunk, in most cases you don’t have so much energy to satisfy a woman.”*

In the present study, the relationship between EDMs and/or sexual enhancer use and the age of the respondents was significant ( $P < 0.001$ ). From the findings, EDMs and/or sexual enhancer use was reported more in older students than younger ones. The independent T-test showed that older students were more likely to use EDMs compared to younger ones. These findings are further buttressed by the FGDs which determined that older students were more likely to engage in risky sexual behavior compared to the younger ones.

*“Older students know where to get the EDMs and sexual enhancers, they also know where to get casual sex.”*

The bivariate analysis also showed that first-year students were less likely to use EDMs and/or sex enhancers compared to fifth-year students. The following statements also emerged from the FGDs to corroborate these findings:

*“First-year students are the least exposed ones and may not engage in risky sexual behaviors. But after some time and succumbing to the peer pressure, they get into the system. Older students know where to get the EDMs and sexual enhancers, they also know how and where to get casual sex.”*

Religion was statistically significant ( $P = 0.006$ ) with Muslim students being less likely to use EDMs. Bivariate analysis indicated that Muslim students were 5.201 [ $\{95\% \text{ CI} = 0.797 - 31.616\}$ ] times less likely to use EDMs or sexual enhancers compared to other religions. These findings support the results from a study by Daskalopoulou *et al.* (2014) who identified that not identifying with religion was significantly associated with the use of multiple drugs including EDMs. From the FGDs the following statement emerged:



*“Our religion does not encourage engaging in sexual activities before marriage and our parents also remind us about not engaging in promiscuity and abstinence”*

Bivariate analysis exhibited a significant relationship between EDM and or sexual enhancers' use and sexual behavior. For instance, students who reported no sexual partner in the past six months were 3.650 [P<0.001, 95%CI= 1.368-9.744] times less likely to use EDMs or sexual enhancers compared to those who reported more than 5 sexual partners. Respondents who reported 0 'one-night' stands were 4.895 [P=<0.001, 95 CI = 1.987-12.060] times less likely to use EDMs and/or sexual enhancers compared to those who reported more than 5 'one-night' stands. The following statements emerged from the FGDs.

*“When drunk, especially after nights of clubbing, it is very possible to engage in unprotected sex. Some of us have even had unprotected sex with prostitutes, orgies, and even casual sex while drunk.”*

From the multivariate analysis, students who reported that they did not use a condom or have knowledge of a partner's status before intercourse were 3.970 [P=0.011, 95%CI 1.379-11.427] times more likely to use EDMs and/or sexual enhancers compared to those who sometimes used the condom or knew the partner's status before intercourse. These findings are consistent with a study done in the United States that indicated a relationship between Viagra use and risky sexual behaviors like engaging in unprotected sex (Fisher *et al.*, 2006).

The respondents from the current study who reported 0-10 lifetime sexual partners were 1.472 [P=<0.000, 95% CI=1.066-2.032] times less likely to use EDMs and/or sexual enhancers compared to those who reported 21 and above lifetime sexual partners. These findings are consistent with a study by Gebreyohannes *et al.* (2016) who concluded that EDM users had a greater number of sex partners in comparison to non-users. Swearingen and Klausner (2005) showed an association between Viagra use and sexual risk behavior, as well as a higher risk for STDs, such as HIV infection.

These findings were further supported by a study indicating that the use of Viagra recreationally was associated with sexual risk behavior and was not used exclusively to increase sexual performance (Harte & Meston, 2012). A study conducted in Australia further demonstrated an association between PDE<sub>5</sub> inhibitor use and increased risk of HIV infection among adventurous gay communities (Prestage *et al.*, 2009). Respondents from the current study who reported not to have engaged in unprotected sex while showing symptoms of an STI were 1.368 [P=0.010, 95% CI .979 -1.910] times less likely to use EDMs and/or sexual enhancers compared to those who reported having engaged in unprotected sex while showing STI symptoms. Daskalopoulou (2014) corroborates these findings by indicating that polydrug use including EDMs is strongly associated with unprotected sex. The study was conducted in the UK and showed that polydrug users including EDMs users are likely to be a group at an especially high risk of transmission of HIV and other STIs.

Healthy young men have continued to use EDMs and/or other sexual enhancers since they can be accessed easily. These drugs have well-identified risks that these young men need to know about including cardiovascular risks and drug dependence. Reports of dangers of EDMs abuse range from unsafe sex practices and increased risk of sexually transmitted infections (STI) to fatal drug interactions. Harte and Meston (2012) also determined that most of the recreational users mixed ED drugs with other illegal drugs and engaged in sexual risk behavior. This current study corroborates these findings as it demonstrates that EDMs and/or sexual enhancers use is associated with a higher number of sexual partners, a greater number of ‘one-night’ stands, heightened levels of unprotected sex as well as substance use.

University lifestyle encourages sexual risk behaviors as established in the FGDs. Independent living for the students denotes a lack of social censure from community members which enables them to experiment with drugs and alcohol and engage in sexual activities.

*“In the university, binge drinking, casual sex, multiple sexual partners, and use of drugs is expected and is part of our social life.”*

*“If we lived with our parents, it would be almost impossible to enjoy some of these things.”*

Studies by Chanakira *et al.* (2014) and Kithuka (2014) indicated that the university lifestyle’s social context was observed to affect risky sexual behaviors through increased sex opportunities, high consumption of alcohol, expectations of a stereotypical highly sexually active student, and liberation from moral scrutiny.

### **5.2.3 Study limitations**

#### **5.2.3.1 Limited Generalizability**

The study was done at one institution, thus, the outcomes should be interpreted sensibly when establishing a causal association. Furthermore, it may be challenging to generalize the finding to the entire population of undergraduate students learning at various universities in Kenya.

#### **5.2.3.2 Recall Bias**

The data presented in this study are self-reported and some of the respondents may have provided extreme responses, depending on the motivations and beliefs of the respondents which make the findings subject to recall bias.

### **5.3 Conclusion**

1. In this study, the prevalence of erectile dysfunction medication (EDMs) and/or sexual enhancer use among the students was 10%.
2. The different types of EDMs and/or sexual enhancers used by the students include Viagra, Vega 100, Stamina, Miagra, herbal aphrodisiacs, and dietary supplements.
3. The main sources EDMs and/or sexual enhancers acquisition include a friend, online pharmacies, night clubs, and pharmacies with no prescription.
4. There was no established association between EDMs and/or sexual enhancers’ use and most of the socio-demographic factors except age, and

religion which had a significant association with EDMs and/or sexual enhancers' use.

5. Alcohol consumption and other substance use as well as risky sexual behaviors including engaging in unprotected sex, a high number of sexual partners, and a high number of 'one-night stands' were associated with EDMs and/or sexual enhancers use among the students.
6. Structural, individual, and lifestyle factors that make up the university social environment play a significant role in influencing sexual risk behaviors and the use of EDMs and/or sexual enhancers among university students.

#### **5.4 Recommendations**

1. Sexual health education and the prevention strategies for risky sexual behavior should consider individual and lifestyle factors.
2. Sexual health services and education in the university should be improved.
3. Awareness campaigns aimed at educating undergraduate students about the risks involved in the recreational use of EDMs and/or sexual enhancers should be done consistently.
4. Sale, purchase, and access to EDMs and/or sexual enhancers should be properly regulated to curtail misuse among university students.
5. Further longitudinal follow-up studies of young healthy men who start using EDMs and/or sexual enhancers for recreational purposes should be done to determine the effects of these drugs in young and healthy men.
6. Continuous monitoring for the variations in the use of EDMs and/or sexual enhancers.
7. To respond effectively, education and research must be challenged to create an emphasis on recreational use of sex enhancers and EDMs as a social problem and not just a health problem as it presents unique and costly consequences to societies.

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**APPENDICES**

**Appendix I: Questionnaire monitoring check-list**

Name of Research Assistant	Issued Serial Numbers	Returned Serial Numbers	Signature of Research Assistant	Date

Checked by Principal Investigator .....

Date.....

## Appendix II: Consent Form



Title of Project: Assessing the Use of Sexual Enhancers and Erectile Dysfunction Medication and the associated factors among Male Undergraduate Students Aged 18-35yrs at Jomo Kenyatta University of Agriculture and Technology, Kenya

Principle Investigator (PI): Kayose Flaviah

PI Phone Number: 0712787992

### **Informed Consent**

#### **Introduction**

Please read this carefully. This form provides more information about the study in which your participation is requested.

I am Kayose Flaviah, and I am currently pursuing a master's degree in Public Health at ITROMID/JKUAT. As part of my curriculum requirements, I have designed a descriptive study that I will be conducting. I am carrying out this research to gain a better understanding of the utilization of erectile dysfunction medication and sex enhancers and factors associated with their use among Male Undergraduate Students Aged 18-35 years at JKUAT.

You are invited to take part in this study willingly. Your participation is completely optional, and you may wish to withdraw from the study at any point without getting penalized. By completing this form, it indicates that you have fully understood all aspects of the study and you give you informed consent to participate in the research.

You are eligible to participate in this study if:

- You are 18-35 years.
- You are a male undergraduate student at JKUAT.
- You consent to participate in the study

You are not eligible to participate in this study if:

- You are less than 18 years or more than 35 years.
- You do not consent to participate in the study

Ethical approval to conduct this study will be obtained from the Scientific Ethics Review Unit (SERU) at KEMRI and because the research poses no harm to the study subjects, the process will be expedited. Kindly ask any questions you may have before agreeing to participate in the research. This consent form's copy will be given to you.

### **Purpose of the Study**

This study purposes to assess the utilization of sexual enhancers and/or erectile dysfunction medication and factors associated with their use among male undergraduate students aged 18-35yrs at Jomo Kenyatta University of Agriculture and Technology, Kenya

Once you agree to participate in this research, you will be requested to meet with the investigator one time, at your own convenient time at a preferable location. The researcher will administer a questionnaire which will include closed and open-ended questions. Anonymity will be maintained by not using the participants' real names during reporting of the results. Privacy and confidentiality will be ensured by locking

the questionnaires and audio recorded focus group discussion tape in an office which will only be accessible to the researcher.

### **Potential Benefits of the Study**

There may be no benefits for you at this time. However, reporting about your experiences may have an advantageous effect on you by having a moment of reflection on your experience to help support the sexual health agenda.

### **Potential Risks of the Study**

There are no foreseeable risks in participating in the research. However, reflecting on some of the experiences regarding the use of these drugs may cause some discomforts or psychological distresses. The researcher's empathy and compassion will help in minimizing these discomforts. A primary physician will be on fallback to provide any counseling if need be.

### **Payments**

There is no payable fee for being part of this research.

### **Costs**

There is no cost for being part of the research.

### **Right to Withdrawal or Refusal of Involvement**

This research is completely voluntary and you will not be penalized if you decide to pull out of the study at any moment or decline to answer the questions. Refusing to take part in the research will not affect your future or current relations with JKUAT and will not affect your student status.

### **Discontinuity from the Research**

The investigator may discontinue you from the research if it is in your best interest like when you fall ill and can no longer continue with the questionnaire or focus group discussions or suffer side effects of distress.

### **Assurance of Confidentiality and Privacy**

Confidentiality and privacy will be highly maintained and all data collected by the researcher will be protected. After the data has undergone transcription, it will be stored on the primary investigator's laptop which will have an access passcode only known to the researcher. The tape-recorded information, informed consent form, list of the participants, and other written notes will be locked in an office that only the researcher can access. The anonymity of the research participants will be maintained by using alphanumeric identifiers that protect their identity. The responses from the interview are not intended to collect specific data about persons but to be able to make generalizations and identify common themes or trends. The analyzed data will be published in academic journals. However, the reports will not contain any information that would make it likely to identify you.

### **Additional Information**

If at any point, before, during, and after the study, the participant has a concern or question, they may contact the principal investigator, Kayose Flaviah Kidake. In case of any concerns, the participant may reach out to the Secretary, KEMRI Ethics Review Committee using the contacts provided. The participant will be given a signed copy of the document to keep for his or her records.

### **Contact Information**

**Principal Investigator:** Kayose Flaviah Kidake- ITROMID/JKUAT, (0712787992), ([flaviah.kayose@gmail.com](mailto:flaviah.kayose@gmail.com)).

**Ethics Review Committee:** The Secretary, KEMRI Scientific and Ethics Review Unit,

P.O. Box 54840-00200, Nairobi.

Tel: +254 020 272 2541, or +254717 719 477

Email: [seru@kemri.org](mailto:seru@kemri.org)

### **Statement of Consent**

I have carefully gone through the above content, and I am confident in my understanding of the research and I can boldly make a sound decision about my participation. By signing below, I realize that I am approving the terms specified above. I recognize the discomforts and risks associated with the research and that I may withdraw from it at any point without suffering any consequences.

Participant Printed Name: \_\_\_\_\_

Participant Signature: \_\_\_\_\_ Date: \_\_\_\_\_

### **Person Conducting the Research**

I have fully and transparently explained the research to the study participants.

I have answered all the questions and concerns to the best of my ability

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

### **ITROMID/JKUAT Approval**

This form has been approved by the ITROMID/JKUAT IRB.

Authorized IRB Approval

Signature: \_\_\_\_\_ Date: \_\_\_\_\_



### Appendix III: Self-administered Questionnaire

These questionnaires will be administered to obtain data at JKUAT on the recreational use of erectile dysfunction medication and sex enhancers. Any information obtained will only be used to improve sexual health among undergraduate male students.

Please tick in the appropriate box as provided:

#### Part A: Demographic data

**Q. Age: How old are you? .....**

**Q. Relationship Status: What is your relationship status?**

Single  In a Relationship  Married  Engaged  Unspecified

**Q. Religion: What is your religion?**

Christian  Muslim  Others

**Q. Socioeconomic Status: Which of the groups represent your family's income?**

Low Income  Middle Income  High Income  Unspecified

**Q. Place of Origin: What is your place of origin?**

Rural  Semi-urban  Urban

**Q. College: What is your study college?**

Health Sciences  Pure and Applied Sciences  Agriculture

Engineering and Technology  Human Resource and Development

**Q. Year of Study: What is your year of Study?**

1<sup>st</sup> Year  2<sup>nd</sup> Year  3<sup>rd</sup> Year  4<sup>th</sup> Year  5<sup>th</sup> Year

**Q. Residence: Do you stay on campus or outside campus?**

Resident on campus  Non-resident

**Part B: Use of Erectile Dysfunction Medication (EDMs) and Sex Enhancers**

**Q. When did you first hear of erectile dysfunction medication and sex enhancers?**

Never Heard Before  Before Joining Campus  After Joining Campus

**Q. Have you ever used any erectile dysfunction medication or sex enhancer?**

Yes  No

**Q. If yes. What type did you use?**

I don't know  Sildenafil (Viagra)  Tadalafil (Cialis, Adcirca)

Vardenafil (Staxyn, Levitra)  Avanafil (Stendra)  Vega 100

Stamina  Miagra  Erection

Herbal Aphrodisiacs  Dietary Supplements  Others

Specify.....

**How did you learn about erectile dysfunction medication or sex enhancers?**

Friend  Mainstream Media  Internet/Social Media

Night clubs  Others  Specify.....

**Q. What was the frequency of using the EDMs during intercourse?**

Rarely (less than half the time)

Sometimes (half the time)

Often (more than half the time)

**Q. Did you know about the dosage of EDMs and sex enhancers?**

Yes  No

**Q. What was your motivation for using the EDMs and/or sex enhancers?**

To increase erectile sensation  To enhance self-esteem  To increase rigidity

To impress or satisfy partner  To increase libido  Curiosity

**Q. Have you ever combined the use of EDMs and sex enhancers with other illicit drugs?**

Yes  No

**Q. If yes, what illicit drugs?**

Alcohol  Khat  Marijuana  Cocaine  Cigarette  Others

**Q. Is it easy to access EDMs or sex enhancers?**

Yes  No

**Q. What is your source of acquisition?**

A friend  Night Clubs  Pharmacies but no prescription

Pharmacies with prescription  Online pharmacies/ social media  Others

**Q. What are your feelings about the use of EDMs and sex enhancers?**

Useless  Not Satisfactory  Satisfactory  Good  Excellent

**Q. What are the side effects after using the EDMs or sex enhancers?**

Headache  Dizziness  Stomach Ache  Flushing

Blurred vision  Sensitivity to light  Longer Erections than wanted

**Q. Do you wish to use EDMs or sex enhancers again?**

Yes  No

**Part C: Sexual Behavior**

**Q. What is the number of sexual partners you have had in the past six months?**

0  1  2  2-5  More than 5

**Q. How many sexual partners have you had all through your life?**

0-10  11-20  21 and above

**Q. How many 'one-night stands' have you ever had?**

0  1  2-5  more than 5

**Q. Did you use a condom or examine your partner's HIV status?**

Yes  No  Sometime

**Q. Have you ever engaged in unprotected sex while showing symptoms of an STI?**

Yes  No

## **Appendix IV: Focus Group Discussion Guide**

### 1. Welcome

Introduction of the principal investigator and the research assistants then send the Sign-In Sheet with a few quick demographic questions (age, university level, religion) around to the group while you are introducing the focus group.

*Review the following:*

- Who we are and what we're trying to do
- What will be done with this information
- Why we asked you to participate

### 2. Explanation of the process

Ask the group if anyone has participated in a focus group before. Explain that focus groups are being used more and more often in health and human services research.

*About focus groups*

- We learn from you (positive and negative)
- Not trying to achieve consensus, we're gathering information
- No virtue in long lists: we're looking for priorities
- In this project, we are doing both questionnaires and focus group discussions. The reason for using both of these tools is that we can get more in-depth information from a smaller group of people in focus groups. This allows us to understand the context behind the answers given in the written survey and helps us explore topics in more detail than we can do in a written survey.

*Logistics*

- The focus group will last about one hour

- Feel free to move around
- Help yourself to refreshments

### 3. Ground Rules

Ask the group to suggest some ground rules. After they brainstorm some, make sure the following are on the list.

- Everyone should participate.
- Information provided in the focus group must be kept confidential
- Stay with the group and please don't have side conversations
- Turn off cell phones if possible
- Have fun
- Ask for permission to be recorded

### 4. Turn on Tape Recorder

5. Ask the group if there are any questions before we get started, and address those questions.

### 6. Introductions

Go around the table for a brief introduction of the participants

**Note: Discussion begins, make sure to give people time to think before answering the questions and don't move too quickly. Use the probes to make sure that all issues are addressed, but move on when you feel you are starting to hear repetitive information.**

Date (day/month/year): \_\_\_\_\_ Start time: \_\_\_\_\_ End time:  
 \_\_\_\_\_ Name of moderator: \_\_\_\_\_ Signature:  
 \_\_\_\_\_

Name of recorder: \_\_\_\_\_

FGD number.....

Number of respondents.....

Male ----Female-----

**Part 1: Background Information**

<b>Student number</b>	<b>code</b>	<b>Age</b>	<b>Year of Study</b>	<b>Religion</b>

**PART 2: Questions**

**Main Question:** What are the lifestyle, individual, structural, socio-cultural factors that influence the use of EDMs and sexual enhancers among male undergraduate students at JKUAT?

**Question One:** Let’s start the discussion by talking about what erectile dysfunction medications and sexual enhancers are?

### **Probes for Discussion**

- Types

FDA-approved EDM, dietary supplements, herbal aphrodisiacs, any other locally available sex enhancers.

- Availability

How do students learn about them? How affordable are they? Are they easily accessible?

Social media/online pharmacies

**Question Two:** Let's talk about how youth and university culture or social life influence the use of EDMs and sex enhancers

### **Probes for Discussion**

- Views on alcohol as the cornerstone of student's social life

Alcohol contribution to risky activities like casual sex and unprotected sex

Alcohol contribution to use of EDMs and sex enhancers

- University environment

University environment increasing the opportunity for sexual encounters compared to other social contexts

- Year of study

Influence on sexual behavior and use

- Independent living

Lack of social censure from community members



Influence on sexual behavior and use

- Active social life

Partying, drinking alcohol, drug use, and social pressure to become highly sexually active

- Media

Social media influence, sexual representations of university students by the media.

**Question Three:** Let's talk about how individual and cultural factors influence the use of sex enhancers and EDMs

### **Probes for Discussion**

- Individual and cultural background influence

Religion, family values

- County of origin

Influence on attitudes towards sex and use

- Social expectations

Binge drinking, casual sex, multiple sexual partners, and use

- Age

Are the younger students more sexually active?

- Risk Denial

Are students aware of the involved risk with risky sexual behavior or use?

Reducing the risk of pregnancy supersedes STIs

Do they ignore the knowledge and act because of short-term benefits of sexual thrills?

**Question Four:** Let's talk about how structural factors influence the use of EDMs and sex enhancers

### **Probes for Discussion**

- Access to sexual health services and education

Availability and accessibility

Inadequate Confidentiality and stigmatization as barriers to utilization of the services

That concludes our focus group. Thank you so much for coming and sharing your thoughts and opinions with us. We have a short evaluation form that we would like you to fill out if you time. If you have additional information that you did not get to say in the focus group, please feel free to write it on this evaluation form.

### **Materials and supplies for focus group discussions**

- Sign-in sheet
- Consent forms (one copy for participants, one copy for the team)
- Evaluation sheets, one for each participant
- Pads & Pencils for each participant
- Focus Group Discussion Guide for Facilitator
- A recording device
- Notebook for note-taking
- Refreshments

## Appendix V: Themes and Responses

Theme	Response(s)
<b>Attitude</b>	
<b>Subthemes:</b>	<b>To boost self-esteem and confidence</b>
<b>a. Reasons for EDMs and/or Sexual Enhancers Use</b>	<i>“It is mostly an issue of confidence and self-esteem.” “It is all about image, we all want to impress our partners with our sexual capability.”</i>  Other responses: curiosity.
<b>b. Whether partners increase the need for use of EDMs and/or sexual enhancer</b>	<b>Pressure from partners</b>  <i>“In the current world of unstable relationships, most young men live in constant fear of their girlfriends walking out if the sexual performance does not meet their standards.”</i>  <i>“Women openly criticize you when you underperform in the bedroom, you just have to seek help elsewhere when it is necessary.”</i>

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**Views on Alcohol contribution to use of EDMs and sex enhancers**

**Alcohol facilitates Use**

*“There is this notion that when one is really drunk, they may underperform sexually”*

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**Practice**

**Viagra**

**a. Types of EDMs and/or sexual enhancers**

*“The blue pill, Viagra is the most common”*

Other responses: Vega 100, African Viagra, Alvoy, Enzoy, Cialis, and Mkhombero.

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**b. Availability and Accessibility of the Drugs**

**Affordable and easily accessible**

*“Currently, these drugs come cheap and with as little as Kshs 50, you can get one kind or the other. Like Enzoy is sold at Kshs. 50 a sachet”*

*“These drugs can be found in pharmacies and kiosks in the estates”*

*“Some of these drugs and supplements are sold online. In fact, Jumia also sells these pills to online shoppers.”*

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**c. Factors influencing use among University students**

Drugs and Alcohol

*“When you smoke bhang, chew mirra (khat), or use other drugs, you end up losing your manly strength. “When you are too drunk, in most cases you don’t have so much energy to satisfy women.”*

Other Responses: Peer pressure; university life; influences from the media; religion; age; independent living; curiosity; social expectations; family values.

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**d. Access to sexual health services and education**

**Lack of proper structures**

*“Issues of erectile dysfunction or poor performance in the bedroom are mostly on the low. Students don’t go around talking about them due to inadequate confidentiality and stigmatization.”*

*“There are no proper structures put in place to educate students about these drugs and their effects.”*

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## **Appendix VI: Multivariate Analysis**

Binary logistic regression was used to identify variables predictive of EDMs and/or sexual enhancers use (0= Did not use, 1= Used). All factors that were related to EDMs and/or sexual enhancers at  $P < 0.05$  in bivariate analysis were used in multivariate analysis.

Religion (1=Christian, 2=Muslim, 3=Others)

Year of Study (1=Year1, 2=Year 2, 3=Year 3, 4=Year 4, 5=Year 5)

No. of lifetime Sexual partners (1=0-10, 2=11-20, 3=21 and above)

Number of sexual partners in the past six months (0=0, 1=1, 2=2, 3= 3-5, 4= More than 5)

Number of 'one-night 'stands (0=0, 1=1, 2=2-5, 3=More than 5)

Use of a condom/knowledge of a partner's status before intercourse (0=No, 1=Yes, 2=Sometimes)

Engaging in Unprotected sex while showing symptoms of an STI (0=No, 1=Yes)

Three successive iterations were performed using the backward condition method retaining four factors, adjusting for other factors and keeping them constant.

**Appendix VII: Map of Kenya showing JKUAT**



## **Appendix VIII: Independent and dependent variables**

### Independent variables

1. Socio-demographic factors (age, gender, marital status, religion)
2. Sexual behavior

### Dependent variable

Erectile dysfunction medications and/or sexual enhancers use.



**Appendix IX: Ethical Review Committee (ERC) (Approval) KEMRI.**



**KENYA MEDICAL RESEARCH INSTITUTE**

P.O. Box 54840-00200, NAIROBI, Kenya  
Tel: (254) (020) 2722541, 2713349, 0722-205901, 0733-400003, Fax: (254) (020) 2720030  
E-mail: director@kemri.org, info@kemri.org, Website: www.kemri.org

**KEMRI/RES/7/3/1**

**April 3, 2019**

**TO: FLAVIAH KAYOSE KIDAKE,  
PRINCIPAL INVESTIGATOR**

**THROUGH: THE DIRECTOR, CPHR,  
NAIROBI**

Dear Madam,

*Forwarded  
Pwembu 8/4/2019*

**Re: KEMRI/SERU/CPHR/006/3800 (RESUBMISSION II OF INITIAL  
SUBMISSION): ASSESSING THE USE OF SEXUAL ENHANCERS AND ERECTILE  
DISFUNCTION MEDICATIONS AND ASSOCIATED FACTORS AMONG MALE  
UNDERGRADUATE STUDENTS AGED 18 – 35 YEARS AT JOMO KENYATTA  
UNIVERSITY OF AGRICULTURE AND TECHNOLOGY, KENYA.**

Reference is made to your undated letter. The KEMRI Scientific and Ethics Review Unit (SERU) acknowledges receipt of the revised study documents on March 28, 2019.

This is to inform you that the issues raised during the 283<sup>rd</sup> Committee A meeting of the KEMRI Scientific Ethics Review Unit (SERU) held on **January 10, 2019**, have been adequately addressed.

Consequently, the study is granted approval for implementation effective this day, **April 03 2019** for a period of **one (1) year**. Please note that authorization to conduct this study will automatically expire on **April 02, 2020**. If you plan to continue with data collection or analysis beyond this date, please submit an application for continuation approval to SERU by **February 19, 2020**.

You are required to submit any proposed changes to this study to SERU for review and the changes should not be initiated until written approval from SERU is received. Please note that any unanticipated problems resulting from the implementation of this study should be brought to the attention of SERU and you should advise SERU when the study is completed or discontinued.

You may embark on the study.

Yours faithfully,

**ENOCK KEBENEI,  
THE ACTING HEAD,  
KEMRI SCIENTIFIC AND ETHICS REVIEW UNIT**

In Search of Better Health

## Appendix X: Approval letter to collect data at JKUAT, main campus



**JOMO KENYATTA UNIVERSITY**  
**OF**  
**AGRICULTURE AND TECHNOLOGY**  
P.O. Box 62000-00200 Nairobi Kenya, Tel: +254-067-5870001-4, +254-67-53-52711,  
Office of the Registrar (Administration)

JKU/ACA/3E

20<sup>th</sup> June, 2019

Kayose Flaviah Kidake  
C/o School of Public Health  
JKUAT

Dear Ms. Kayose

RE: PERMISSION TO COLLECT DATA

Reference is made to your letter dated 30<sup>th</sup> April, 2019 in which you sought permission to collect data for MSc research project on **“Assessing the use of sexual enhancers and erectile dysfunction medication and associated factors among male undergraduate students aged 18 – 35 years at JKUAT main campus”**.

Approval has been granted for you to collect data on the understanding that all the data collected will be for academic purpose only and will be kept confidential throughout the project and after completion of the project.

Yours sincerely,

A handwritten signature in blue ink, appearing to read 'Joseph Obwogi', is written over a horizontal line.

**DR JOSEPH OBWOGI, PhD**  
**REGISTRAR (ADMINISTRATION)**  
JO/mw

Copy to: - Deputy Vice Chancellor (Admin)